in the State of Texas, to secure maintenance and repair of subdivision for the period ending at least twelve (12) months subsequent to acceptance of the subdivision improvements by the City.

Division 2 Infrastructure Standards

35-502 Traffic Impact Analysis

(a) Specific Requirements for Transportation LOS

(1) Traffic Impact Analysis (TIA)

No Permit shall be approved unless a traffic impact analysis (TIA) or PHT Generation Form is completed and approved as provided in this Section. A traffic impact analysis (TIA) or a PHT Generation Form shall be performed by the property owner (or its agent) according to the format established in Appendix B, § 35-B122. The type of submittal shall be based upon the number of peak hour trips (PHT) generated by the proposed development, as set forth in Table 502-1.

Table 502-1

Peak Hour Trips	Submittal Category (see Appendix B)
1,001 or more	Level 3 TIA
501 – 1,000	Level 2 TIA
101 – 500	Level 1 TIA
100 or less	PHT Generation Form (no TIA is required)

When an activity on, or change to, property occurs that varies from the activity on which a previous TIA was submitted and accepted, and the new activity places the project into a Level different from that of the previous TIA or generates an increase of at least 100 PHT (or 10 percent for a Level 3 TIA) relative to the previous TIA, the property owner (or its agent) shall perform and submit to the City an amended TIA under the formats specified in Appendix B, § 35-B122. For the purposes of this section, the amendment will be satisfactory to determine if the increase in PHT impacts capacity and requires additional mitigation as defined herein.

(2) Permits or Development Orders

The appropriate level TIA as required by subsection (a) of this Section may only be required by the City as part of the approval process for the activities described in **Table 502-2** for each respective category of property, as follows:

Table 502-2

Category	Description	Point at Which TIA is Required
Pre-Development	Property which is not the subject of a valid Master Development Plan	May be required as a condition of acceptance of a Master Development Plan.
Pre-Platting	Property which is the subject of a Master Development Plan	May be required at the time of platting, as a part of the plat approval process.
Platted	Property which is the subject of a valid plat which has been accepted and approved by the City.	May be required at the time a building permit is requested.
Post-TIA	Property which is the subject of a TIA provided at one of the points identified above (or for which the Director of Public Works has determined no TIA is needed) or voluntarily provided by the Developer.	No further TIA required.

(3) Rezoning

A. A TIA may be required any time a property owner seeks to rezone property that is the subject of a Master Development Plan in a manner that: (i) would change the character of use (i.e., commercial, multi-family, residential etc.) of the property from the use(s) proposed in the Master Development Plan; and (ii) results in the PHT under the proposed zoning and use exceeding by more than 100 PHT the maximum PHT that could have been generated by uses permitted in the existing land use classification, or results in a TIA level different from that derived from the existing Master Development Plan.

B. A TIA may be required any time a property owner seeks to rezone property that is not the subject of a Master Development Plan in a manner that would result in the PHT under the proposed zoning and use exceeding by more than 100 PHT the maximum PHT that could have been generated by uses permitted in the existing zoning, or results in a TIA level different from that derived from the existing zoning.

C. The requirement to perform a TIA under this subsection shall not apply if the existing zoning is a temporary zoning resulting from annexation.

(4) Impact Area

The Impact Area is the area within which any analysis is conducted in order to determine compliance with the Level of Service Standards. This area shall be based on the size of the development and the PHTs projected to be generated by the proposed development. The impact areas shall be established as follows:

Table 502-3

Category	Impact Area
Level 1 or 2 TIA	the site, and the area within a one-quarter (¼) mile radius from the boundary of the site
Level 2 TIA	The City Traffic Engineer may require the area of the study to be extended up to a maximum area of one (1) mile radius.
Level 3 TIA	the site, and the area within a one mile radius from the boundary of the site

(5) Mitigation

The Applicant may propose mitigation measures as described in subsections (8) through (10) herein as an alternative to deferral or Permits or denial of the Application. Mitigation measures may be permitted which would allow the LOS to be achieved by permitting the transportation network to function more efficiently, or which advance the construction of necessary transportation facilities so that they are available concurrent with the impacts of the development.

A. Roadways and intersections, within the study area, that are expected to operate at level of service D, E, or F, under traffic conditions including projected traffic plus site-generated traffic must be identified and viable recommendations made for raising the traffic conditions to level of service C or better.

B. As depicted in Table 502-4, roadways and intersections within the project site and along its boundary streets which are projected to operate at level of service D, E, or F, without site-generated traffic, need not to be brought up to level of service C by the proposed development. Such roadways and intersections, under conditions which include such site generated traffic, must be brought up to the projected Level of Service that would exist without the site-generated traffic, by altering on-site and/or off-site traffic demands and/or capacities. Level of Service notwithstanding, required traffic impact mitigation improvements are limited to those that can be implemented within the project site and along its boundary Streets.

Table 502-4 Minimum Acceptable Level of Service

		Level of Service Without Development					
		A	B	C	D	E	F
Projected Level Of Service	A	NA	-	-	-	-	-
	B	B	NA	-	-	-	-
	C	C	C	NA	-	-	-
	D	C	C	C	NA	-	-
	E	C	C	C	D	NA	-
	F	C	C	C	D	E	NA

(6) Implementation

For phased construction projects, implementation of these traffic improvements must be accomplished no later than the completion of the project phase for which the capacity analyses show that they are required. Plats for project phases subsequent to a phase for which a traffic improvement is required may be approved only if the traffic improvements are completed or bonded.

(7) Limitations on Traffic Impact Mitigation

A. Additional limitations on traffic impact mitigation requirements are as follows:

1. Off-site traffic impact mitigation improvements are not required on public streets for which a funded capital improvement project is scheduled to be accomplished within three (3) years of the TIA review.

2. Requirements for mitigation for land development projects located inside the circumferential freeway, Interstate Highway 410, will be considered on a case by case basis and may be waived by the City Council for City-sponsored infill development project.

B. Voluntary efforts, beyond those herein required, to mitigate traffic impacts are encouraged as a means of providing enhanced traffic handling capabilities to users of the land development site as well as others.

C. Traffic mitigation tools include, but are not limited to, pavement widening, turn lanes, median islands, access controls, curbs, sidewalks, traffic signalization, traffic signing, pavement markings, etc.

(8) Exemptions

The City finds and determines that certain factors, such as interconnected Street systems, mixed uses, and the availability of pedestrian facilities, can result in fewer trips than isolated, low-density subdivisions. Certain development patterns produce fewer trips and shorter trips than developments subject to conventional zoning or located on the fringe of the metropolitan area. The City hereby finds that traffic patterns and infrastructure within its urban core are established, and that there is a strong public policy to encourage reinvestment in the City's downtown areas. Further, The City hereby finds that there is a strong public policy to encourage infill development and that there is little opportunity to expand transportation capacity in many infill areas without destroying the City's historic built environment. Accordingly, the following are exempt from the provisions of this Section.

A. Applications for Development Approval within the "D" Downtown District.
B. Any development within an Infill Development Zone (IDZ).
C. Any Traditional Neighborhood Development (TND) or any Transit-Oriented Development (TOD).

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35-503 Parks/Open Space Standards

Parks and open space provide a valuable asset to the urban form of the City, its historical development, and the general welfare of its residents. Parks and open space have provided a significant role in the history of the City of San Antonio. The Laws of the Indies provided that the size of the parks and open spaces, such as plazas, shall be proportioned to the number of inhabitants and should take into consideration the growth of the community. Consistent with the historical development of the City, it is the intent of this Section that parks and open space should provide focal points for new communities. A central square or green, for example, may comprise a majority of the area required for dedication.

This Section implements the following provisions of the Master Plan:

- *Neighborhoods, Policy 3a: Protect the character and quality of neighborhoods by maintaining and enhancing their open spaces and parks.*
- *Neighborhoods, Policy 3a: Amend applicable ordinances to require developers of subdivision plats with private common areas, to establish mandatory homeowners associations which shall be responsible for the maintenance of the common areas, or otherwise provide for same.*
- *Neighborhoods, Policy 3a: Amend applicable ordinances to require developers of subdivision plats with private common areas to file a proposed operations budget and plan for long term capital repair and replacement.*
- *Natural Resources, Policy 1d: Policy 1d: Encourage retention of the 100-year floodplains as natural drainage ways without permanent construction, unnecessary straightening, bank clearing or channeling.*
- *Natural Resources, Policy 1d: Encourage the ecological management of floodplains and promote their use as open space, such as greenways, parks, wildlife habitat, and pedestrian-friendly linkage corridors.*
- *Urban Design, Policy 1g: Prepare design and construction policies and standards for utility and transportation infrastructure, capital improvement projects, public facilities and development projects that reinforce neighborhood centers and provide diverse, pedestrian-friendly neighborhoods.*
- *Urban Design, Policy 3a: Ensure that parks are fully accessible to all citizens.*
- *Urban Design, Policy 3a: Encourage conservation and protection of identified properties through leases, conservation or scenic easements, overlay zoning districts, protective covenants, tax abatements, or acquisition (by purchase or donation).*
- *Urban Design, Policy 3a: Develop a requirement that subdividers of land provide recreational opportunities for City residents through the dedication of park land, or fees in-lieu of dedication.*

(a) Applicability

(1) The provisions of this section shall apply to any application for residential subdivision plat approval, unless exempt pursuant to subsection (3), below.

(2) The location and extent of ~~Parks and/or Open Space~~ Parks/Open Space or designation of a fee-in-lieu of option shall be indicated on any Master Development Plan. , with dedication deferred until a subdivision plat is filed consistent with

subsection (g) of this section. Where indicated, the required area shall conform to the requirements of subsection (b) as they relate to the total number of dwelling units approved at the time the Master Development Plan is filed.

Commentary: The Master Plan requires new subdivisions to include parks or to pay fees in lieu of providing parks. Developers may opt to show parks on a Master Development Plan in order to facilitate the phasing of subdivision plats filed pursuant to the Master Plan. This allows some plats to be approved without individually complying with this Section, so long as the requirements of this Section are met for the entire development subject to the Master Development Plan. The applicant and the City may also execute a deferment contract which provides for the provision of parks/open space during a future phase of the development.

(3) The provisions of this Section do not apply to:

A. A proposed subdivision which includes less than twenty-five (25) lots; or

~~B.~~ A proposed subdivision located within an Infill Development Zone; or

C. A proposed subdivision located within a planning area which has a surplus of impoved neighborhood parks/open space, as designated in the Parks Master Plan unless the surplus has been eliminated by the subsequent approval of residential dwelling units within the planning area, as measured by the level of service standard established in Table 503-1, Column (B).

(b) Required ~~Park or Open Space~~Parks/Open Space

(1) Required parks/open space shall be reserved for any development in the zoning districts or areas set forth in column "A" of Table 503-1, below, based upon the number of Dwelling Units in the proposed development corresponding the zoning district as set forth in Column "B" in **Table 503-1** hereto.

Table 503-1
Required Parks

(A) Zoning District(s) Or Areas	(B) Required Parks or Open Space (acres per Dwelling)*
ETJ	1 per 114
CS, RE	N/A
R-20, R-15, R-10, R-8, R-6, RM-6, R-5, RM-5, R-4, RM-4, MH, MF-25, MF-33, MF-40, MF-50, TND, PUD, DR	1 per 114
O-1, O-2, NC, C-1, C-2, C-3, D	N/A
L, I-1, I-2	N/A

* The required acreage shall be rounded to the nearest one-tenth (e.g., 150 dwelling units x [1/114] = 150 x 0.009 = 1.3 acres)

(2) The applicant may dedicate any trail specifically delineated in the Parks and Recreation System Plan (adopted January 1999) to the public. Any trail dedicated pursuant to this subsection will count towards meeting the required active parks and open space requirements of Table 503-1. The trails shall be maintained in accordance with subsection (f)(Preservation of Parks and/or Open Space) of this Section.

(3) The types of park or open space which may be provided to satisfy the requirements of this Chapter are described in Table 503-2. The description of each category of park or open space is set forth in Column (B) of Table 503-2. Minimum dimension, improvement, and maintenance requirements shall be consistent with Column (C) of Table 503-2. (Note: set-aside provisions are set forth in Table 503-1). The applicant may choose among the types of parks or open space to include within the proposed development consistent with the overall minimum set-aside requirements of Table 503-1 and the requirements of subsection (d) of this Section.

(4) The required park or open space areas shall be provided as common area for the use of all residents/occupants of the Proposed Development.

(5) The following areas shall not be considered parks or open space pursuant to this subsection:

A. Areas covered by buildings, parking lots, or other impervious surfaces accessible to automobiles provided, however, that not more than fifty percent (50%) of a parking area accessory to, and reserved exclusively for, a park or open space area shall be counted toward the minimum land area required by this subsection.
B. Utility easements, drainage easements, or street rights-of-way, unless such areas are useable for public recreational purposes and will not be permanently converted to a street or trench. Land underneath overhead utility lines shall in no instance be considered a park/open space except where used for jogging trails, bicycle trails, or parking areas accessory to a park/open space.
C. Streets.
D. Ponds or lakes exceeding 2,500 square feet, unless surrounded by an upland area with a minimum width of twenty-five (25) feet.

(6) Any excess capacity of a park or open space provided pursuant to this section may be credited toward the dedication required herein for another subdivision within a one-mile radius (subject to subsection (e)(1) of this section) or a benefit area for fees in lieu of dedication defined pursuant to subsection (c) of this section, where:

A. the subdivision for which the credit is applied is under Common Ownership by the same Applicant; and
B. the park/open space areas are accessible to each subdivision.

(c) Fee in Lieu of Land Dedication (Optional)

(1) In lieu of dedicating and improving park or open space lands as required by this section, the applicant may deposit with the City a cash payment in lieu of land.

(2) The Director of Parks and Recreation shall determine the amount to be deposited, based on the following formula:

$$A \times V = M$$

where

A = the amount of land required for dedication as determined in subsection (b) of this Section.

V = fair market value (per acre) of the property to be subdivided, as established by an appraisal.

M = the number of dollars to be paid in lieu of dedication of land.

(3) For purposes of computing fair market value of property (see "V" in the equation established in subsection (3), above), the subdivider may select one of the following fair market value determinations:

A. the current fair market value of the land as shown on the records of the tax appraisal district if based upon an appraisal that occurred within two years prior to the application; or

B. the current fair market value of the land as determined by a qualified real estate appraiser at the subdivider's expense, if the City Real Estate Manager certifies that the appraisal fairly reflects the land value; or

C. the current fair market value of the land as determined by a qualified real estate appraiser employed by the City; or

D. the actual purchase price of the property as evidenced by a purchase money contract, or a closing statement (within one year of the date of application).

(4) The city shall reduce the in-lieu fee by the amount of any reasonable costs for any land which has been dedicated to and accepted by the city for park/open space facilities by the applicant within the proposed development, subject to the following:

A. The reasonable costs of the park/open space facilities that have been dedicated shall reduce the park/open space in-lieu fee due for only the same type of park facility.

B. The unit costs used to calculate the reduction shall not exceed those assumed as the average costs of the park/open space facilities which were used to compute the parks/open space in-lieu fee for the benefit area in which the property is located.

C. No reduction shall be granted that exceeds the park/open space in-lieu fee due for the development.

D. Any reduction created by the dedication of park/open space facilities shall expire ten years after the date that the offset was created.

E. An applicant may apply for a reduction of park fees either at the time of approval of a subdivision plat or at the time of dedication by separate instrument. The Applicant may appeal the determination of the Director of Parks and Recreation concerning the reduction to the city council.

F. The amount of the reduction shall be prorated among the number of dwelling units approved for the development unless otherwise agreed to by the city.

(5) Park/open space in-lieu fees shall be assessed at the time of plat approval and shall be paid at the time of plat recordation.

(6) All fees collected shall be used for the acquisition or development of land for a neighborhood park, or development or construction of improvements to existing park land, within one (1) mile of the periphery of the proposed subdivision development. However, if [1] such acquisition opportunities are not available, or [2] existing park land is already developed or improved, within one (1) mile of the proposed subdivision development, then areas within two (2) miles of the periphery of the proposed subdivision development may be considered for the acquisition, of neighborhood park land and/or construction of improvements to existing park land within such periphery.

(7) There is hereby established a special fund for the deposit of all fees collected under this subsection (c), which fund shall be known as the park acquisition and development fund. Within the fund, park development fees paid shall be earmarked for expenditure on park improvements in a neighborhood park generally located within the distance described in subsection (7), above. All fees in lieu of park land dedication and all park development fees paid must be expended within ten (10) years from the date of receipt for park facilities benefiting the residential subdivision or dwelling unit for which the fees are paid. Fees shall be considered expended if they are spent for acquisition or development, respectively, of neighborhood parks located ~~within one-half (1/2) to one (1) mile of the subdivision~~ as per section (c)(7) above for which the fees were paid within the ten-year period. If fees are not expended within such period, the then-current owner shall be entitled to a refund of the principal deposited by the Applicant in such fund, together with accrued interest. The owner must request such refund in writing within three hundred sixty-five (365) days of entitlement or such right shall be waived. Interest accruing to the park land dedication fund and to the park development fund shall be expended on neighborhood park land acquisition and for neighborhood park improvements, respectively.

(d) Park and Open Space Characteristics

(1) Generally

Land designated as a park or open space shall be maintained as a park or open space and may not be separately sold, subdivided, or developed except as provided below. Natural Areas, Greenways or Greenbelts shall not be cleared except as needed to provide Trails where permitted by § 35-503(b), above. The applicant shall provide at least one (1) acre of

park /open space land if land is to be dedicated to the City, unless a fee in lieu is paid pursuant to subsection (c) of this Section.

(2) Designation

Any areas reserved as a park or open space shall be indicated on the Application for Development Approval. An Parks and Open Space Provision and Maintenance Plan shall be submitted as a part of the application for development approval including the project phasing schedule. This plan shall designate and indicate the boundaries of all proposed parks or open-space required by this Section. The plan shall:

A. Designate areas to be reserved as a park or open space.
B. Designate the type of park or open space which will be provided.
C. Specify the manner in which the park or open space shall be perpetuated, maintained, and administered.

(3) School Site Locations

Park sites shall be located, whenever possible, adjacent to and contiguous with school sites in order to make maximum use of common facilities and grounds. Land area dedicated to a school district shall be credited toward the minimum requirements of subsection (b) of this Section if there is a joint use agreement between the City and the school district.

(e) Suitability

In order to ensure that all designated parks and/or open space has suitable size, location, dimension, topography and general character, and proper road and/or pedestrian access, as may be appropriate, to be usable parks and/or open space, the following standards shall apply.

(1) Distance from lots

Parks and Open Space shall be not further than one (1) mile (5,280 feet) from any lot or, if the proposed development does not involve a subdivision, any primary building, measured from the entrance allowing people, bicycles or equestrians to enter into the park or open space or to view the park or open space area. The foregoing distance shall be measured in a straight line, provided that the distance shall not be interrupted by an existing Arterial Street or Freeway. The distance may be measured from a park or open space provided pursuant to this section, or a public park or public open space area not provided by the Applicant.

(2) Parks or Open Space in floodplains or water features

A. Areas within a floodplain shall not exceed fifty percent (50%) of the area counted as Parks or Open Space pursuant to subsection (b), above, except as provided below.
B. Water features exceeding 2,500 square feet shall not be considered as Parks or Open Space unless permitted by subsection C, below.

C. The restriction on the maximum percentage of parks/open space in water features or floodplains (hereinafter "Restricted Areas") can be increased to seventy-five percent (75%) where:

1. An area of not less than an average of twenty-five (25) feet in width surrounding a pond or adjacent to a floodplain is improved as a Greenway; and
2. The structures or activities located with the Restricted Areas do not cause an increase in base flood elevations; and
3. The velocities during a ten-year flood event do not exceed six (6) feet per second; and
4. For parks/open space dedicated to the City, at least one (1) acre is outside of the floodplain.

(3) Percentage in retention or detention areas

Retention areas or detention basins which are required as part of the Stormwater Management Standards shall not qualify as a Park or Open Space area unless fifty percent (50%) or more of the active and usable area is above the twenty-five (25) year storm and is designed for multiple uses and the area(s) conforms to the requirements below.

~~A.~~ Retention or detention areas shall be included as part of a Greenbelt or a Greenway (see § 503-2, below). Retention or detention areas shall not be inundated so as to be unuseable for their designated recreational purposes.

B. Retention or detention areas shall be constructed of natural materials. Terracing, berming and contouring is required in order to naturalize and enhance the aesthetics of the basin. Basin slopes shall not exceed a three to one (3:1) slope.

(4) Landscaping

Parks or open space areas shall be landscaped where required by Table 503-2.

(5) Walls and Fences

Walls and fences, if used shall not exceed six (6) feet in height. This requirement shall not apply to fences used in conjunction with athletic fields and courts.

(6) Playground equipment

Playground equipment shall be located toward the interior of parks.

(7) Buffers (§ 35-510) or Landscaped Areas (§ 35-511)

Any buffer or landscaped area provided pursuant to § 35-510 or 35-511 of this Code which meets the requirements of of Table 503-2 for a particular category of Parks or Open Space shall be credited toward the minimum Parks and Open Space requirements of subsection (b) hereto.

(8) Slopes

At least fifty (50) percent of required dedicated park or open space land shall have slopes not exceeding seven percent (7%).

(9) Access

Parks and/or open space provided pursuant to this Section shall have direct access to a public street or to a private street maintained by a Homeowners Association, Condominium Association, or Apartment Association.

(f) Designation of Parks/Open Space.

Areas designated as Parks or Open Space shall not be subdivided, but shall be shown as a "Park" or "Open Space" on a plat. In order to ensure that open-space areas are maintained so that their use and enjoyment as parks and/or open space are not diminished or destroyed, parks and/or open-space areas may be owned, preserved, and maintained by any of the mechanisms described in subsections (1) through (6) below, or combinations thereof. Land protected pursuant to this subsection which is intended to be used as a park shall be deeded as a park, regardless of ownership. The instruments creating the dedication, homeowners association, condominium association, easement, transfer, or improvement district shall be provided with the application for subdivision plat approval.

(1) Dedication of Land to City

Dedication of the park or open space to the City shall satisfy the requirements of this subsection. Dedication shall take the form of a fee simple ownership. The City shall accept undivided parks and/or open space provided: (1) such land is accessible to the residents of the City; (2) there is no cost of acquisition other than any costs incidental to the transfer of ownership such as title insurance; and (3) the park/open space area meets the requirements of subsection (d)(1) of this Section.

(2) Homeowner's Association

A. Common ownership of the parks and/or open space by a permanent homeowner's association which assumes full responsibility for its maintenance. The restrictive covenants shall provide that, in the event that any private owner of parks and/or open space fails to maintain same according to the standards of this Chapter, the ~~City Council~~ Director of Parks and Recreation may, following reasonable notice and demand that deficiency of maintenance be corrected, enter the parks and/or open space to maintain same. The cost of such maintenance shall be charged to those persons having the primary responsibility for maintenance of the parks and/or open space. The association shall be formed and operated under the following provisions:

1. The developer shall provide a description of the association, including its bylaws and methods for maintaining the parks and/or open space.

2. The association shall be organized by the developer and shall be operated with a financial subsidy from the developer, before the sale of any lots within the development.

3. Membership in the association is automatic (mandatory) for all purchasers of homes therein and their successors. The conditions and timing of transferring control of the association from developer to homeowners shall be identified.

4. The association shall be responsible for maintenance of insurance and taxes on undivided parks and/or open space, enforceable by liens placed by the City on the association. The homeowners' association shall be authorized under its bylaws to place liens on the property of residents who fall delinquent in payment of such dues or assessments. Such liens may require the imposition of penalty interest charges. Should any bill or bills for maintenance of undivided parks and/or open space by the City be unpaid by November 1 of each year, a late fee of fifteen percent (15%) shall be added to such bills and a lien shall be filed against the premises in the same manner as other municipal claims.

5. A proposed operations budget and plan for long term capital repair and replacement of the parks or open space shall be submitted with the final plat.The members of the association shall share the costs of maintaining and developing such undivided parks and/or open space. Shares shall be defined within the association bylaws. The operations and budget plan shall provide for construction of any improvements relating to the parks and/or open space within three (3) years following recordation of the plat.

6. In the event of a proposed transfer, within the methods here permitted, of undivided parks and/or open space land by the homeowners' association, notice of such action shall be given to all property owners within the development.

7. The association shall have or hire staff to administer common facilities and properly and continually maintain the undivided parks and/or open space.

B. The homeowners' association may lease parks and/or open space lands to any other qualified person, or corporation, for operation and maintenance of park and/or open space lands, but such a lease agreement shall provide: (1) that the residents of the development shall at all times have access to the park and/or open space lands contained therein; (2) that the undivided parks and/or open space to be leased shall be maintained for the purposes set forth in this Chapter; and (3) that the operation of parks and/or open space facilities may be for the benefit of the residents only, or may be open to the residents of the City, at the election of the developer and/or homeowners' association, as

the case may be. The lease shall be subject to the approval of the board and any transfer or assignment of the lease shall be further subject to the approval of the board. Lease agreements so entered upon shall be recorded with the County Recorder of Deeds within thirty (30) days of their execution and a copy of the recorded lease shall be filed with the City.

C. Failure to adequately maintain the undivided parks and/or open space in reasonable order and condition constitutes a violation of this Chapter. The City is hereby authorized to give notice, by personal service or by United States mail, to the owner or occupant, as the case may be, of any violation, directly the owner to remedy the same within thirty (30) days.

(3) Condominiums.

The undivided parks and/or open space and associated facilities may be controlled through the use of permanent condominium agreements, approved by the City. Such agreements shall be in conformance with the Uniform Condominium Act, VTCA Property Code, Chapter 82. All undivided parks and/or open space land shall be held as a "common element." A proposed operations budget and plan for long term capital repair and replacement shall be submitted with the Application for Development Approval.

(4) Dedication of Easements.

The City may, but shall not be required to, accept easements for public use of any portion or portions of undivided parks and/or open space land, title of which is to remain in ownership by condominium or homeowners' association, provided: (1) such land is accessible to City residents; (2) there is no cost of acquisition other than any costs incidental to the transfer of ownership, such as title insurance; and (3) a satisfactory maintenance agreement is reached between the developer, condominium or homeowners' association, and the City. Land dedicated as a Natural Area, Greenway, or Greenbelt shall be subject to a duly executed conservation easement meeting the requirements of and enforceable in accordance with V.T.C.A., Natural Resources Code § 183.001 et seq., which easement shall be unlimited in duration.

(5) Transfer of Easements to a Private Conservation Organization.

An owner may transfer perpetual easements to a private, nonprofit organization, among whose purposes it is to conserve parks and/or open space and/or natural resources (such as a land conservancy), provided that:

A. the organization is a bona fide conservation organization with perpetual existence;
B. the organization is financially capable of maintaining such parks and/or open space;
C. the conveyance contains legally enforceable provisions for proper reverter or retransfer in the event that the organization becomes unwilling or unable to continue carrying out its functions;
D. the organization shall provide a proposed operations budget and plan for long term capital repair and replacement; and

E. a maintenance agreement is entered into by the developer and the organization.

(6) Improvement Districts

An improvement district established pursuant to:

A. the Public Improvement District Assessment Act, Tex. Local Gov't Code § 372.001 *et seq.*
B. a Municipal Utility District established pursuant to Tex. Water Code, Chapter 54.
C. Tax Increment Financing pursuant to Tex. Local Gov't Code, Chapter 374
D. A development corporation established pursuant to Development Corporation Act, Tex. Rev. Civ. Stat. Ann. art 5190.6

(g) Development Phasing

(1) The purpose of this subsection is to establish a procedure for enforcing the requirements for parks and open space through development phasing, while providing flexibility in the development approval process. This procedure recognizes that there is usually a delay between the date when a subdivision plat is approved and when lots are built upon and occupied, thereby creating a demand for parks and open space.

(2) In residential subdivisions which are to be platted in two (2) or more phases, the required park or open space dedication, pursuant to this Section, must be provided in each phase of the subdivision except as provided in subsection ~~(2)~~(3), below.

(3) If the subdivision is proposed in phases and the proposed park or open space is shown on a Master Development Plan, the applicant may plat the first 114 lots pursuant to the Master Development Plan and defer the provision of parks and/or open space to future phases of the development provided, however, that:

A. No further subdivision plat shall be approved unless and until parks or open space are provided in increments equal to the acreage required pursuant to subsection (b) of this Section, subject to the phasing provisions of Table 503-3 below; and

Table 503-3

Number of lots per phase	Acres of Parks or Open Space Required	Timing of Improvements
Phase 1: 1-114	Up to 1 (minimum size of 1 acre)	Phase 2
Phase 2: 115-128	Up to 2	Phase 3
Phase 3 through completion of development	As required by subsection (b) of this Section	At time of platting

B. If any phase of the subdivision is platted without providing the required parks or open space at the time of platting and no future subdivision phases are planned pursuant to the Master Development Plan, the parks or open space required shall be provided within one (1) year after recordation of the plat and shall be secured by deferment contract as provided in subsection (4). The failure to provide parks or open space as provided herein shall be deemed a violation of this Chapter and shall be enforceable as provided in § 35-494.

Example: A Master Development Plan is approved for 500 residential lots. The Applicant may secure plat approval for the first 114 lots without providing parks or open space. The Applicant files a plat for approval of a second phase containing 150 lots. The second phase may not be approved until at least one (1) acre of parks or open space is provided based on the number of lots approved in Phase 1.

(4) The city shall authorize the developer to reserve park land for dedication in subsequent phases of the subdivision by executing an enforceable contract with the City. The contract shall be approved by the City Attorney and city Director of Parks and Recreation. In addition, the developer shall dedicate a reversionary public access easement on the final plat of the proposed development where necessary to provide effective public access, maintenance and use of any park land to be dedicated.

(h) Private Facilities

(1) Where a park or open space area is provided in a proposed residential subdivision and such area is to be privately owned and maintained by the future residents of the subdivision, credit may be given to the Applicant where the following requirements are met:

A. The park or open space shall be maintained as provided in subsection (f) of this Section. The ultimate owner of the parks and/or open space shall be responsible for raising all monies required for operations, maintenance, or physical improvements to the parks and/or open space through annual dues, special assessments, or similar arrangements.

B. The use of the private parks and/or open space is restricted for park and recreation purposes by recorded covenant, which runs with the land in favor or future owners of the property and which cannot be defeated or eliminated without the written consent of the city or its successors;

C. The proposed private parks and/or open space shall be reasonably adaptable for use for park and recreational purposes, taking into consideration such factors as size, shape, topography, geology, access and location.

(2) The private parks and/or open space for which credit is given, or a combination of such and other recreational improvements that will meet the specific recreation park needs of the future residents of the area, shall conform to at least one of the elements of Table 503-4, Column (A). The element shall conform to the design criteria listed in Column (B) of Table 503-4. Credit shall be given toward the minimum land dedication

requirement (see subsection (b) of this Section) at the rate specified in Column (C) of Table 503-4.

(3)

Table 503-4
Private Park Facilities

(A) *Criteria List*	*(B)* *Design Criteria*	*(C)* *Credit Acres*
Playground	See Table 503-2 and subsection (3), below.	0.75
Picnic area.	Picnic areas shall have a mimimum area of 5,000 square feet. A picnic unit is defined as a concrete or metal picnic table and two benches with an adjacent trash receptacle. Tables and benches are to be permanently anchored to the slab. If a cooking grill is to be installed, it must be pedestal mounted at a corner of the slab. Each park must contain a ratio of two picnic units per acre, with a minimum of two picnic units installed in each picnic area. A minimum of 50% of picnic tables must be accessible, as defined by the ADA and any implementing regulations.	0.50
Athletic Courts	The court slab shall have a slope not exceeding two percent (2%) and shall be constructed of concrete. A basketball court must be a minimum of fifty feet by forty feet, with two metal goals, nets, backboards, and poles at each end. A tennis court must be a minimum of sixty feet by one hundred twenty feet, with metal net and posts.	0.50
Open Play Areas	An Open Play Area shall include a minimum area of 20,000 square feet per three (3) acres. The areas shall be unobstructed by trees, shrubs, or utilities, with a slope not to exceed five percent (5%). Common Bermuda grass shall be established in these areas.	Ratio of 4 square feet for every 1 square foot provided
Swimming pool	Minimum 2,500 square feet, with adjacent deck and lawn areas.	2.50
Recreation center building	The building shall be in habitable condition and shall have a minimum 1,000 square feet of gross floor area. The covenants and restrictions of the homeowner's association shall restrict the building for use as a recreational and/or meeting area for use by all residents of the subdivision. Architectural design shall conform to the restrictive covenants recorded for the subdivision.	1.50
Recreation community gardening	Community gardens shall have a minimum area of 10,000 square feet with a slope not exceeding two percent (2%).	0.25
Jogging or walking trails	Trails shall have a minimum length of one-quarter mile. Trails shall be constructed of either crushed granite or asphalt, with a minimum thickness of four inches, a minimum width of 8 feet, and shall be sloped to drain.	1.50

(4) Specifications for playgrounds as set forth in Table 503-4 shall conform to the following minimum requirements:

A. The playground area shall have a slope not exceeding two percent (2%).

B. Playgrounds are to include equipment for two distinct play abilities, one designed for ages 2 – 5 years old, and the second designed for ages 5 – 12 years old. The equipment may be located in the same or in separate areas.

C. A transfer station required by the Americans with Disabilities Act (ADA) and the actual playscape structure (posts and railings) may not be included as one of the required activities.

D. The following items shall be provided: at least two park benches and one trash receptacle.

(i) Connectivity

The City hereby finds and determines that an interconnected system of parks, trails, greenways, and bikeways provides a greater public benefit than isolated parks with access exclusively by automobiles. Such areas can provide form to neighborhoods, a common public gathering space, and an opportunity to protect natural areas. Accordingly, this section provides incentives for developers to link parks and open space provided pursuant to this section with park and open space areas provided pursuant to subsection (b) of this section. It is not the intent of this section to require developers or landowners to provide a general public benefit, but rather to create incentives for creativity in the design of parks and open space as well as creative opportunities to meet the requirements of this section.

(1) Greenbelts, Greenways, or Linear Parks provided pursuant to this Section shall be credited toward the minimum park and open space area requirements of subsection (b) of this Section at a ratio of one acre for every 20,000 square feet provided, where:

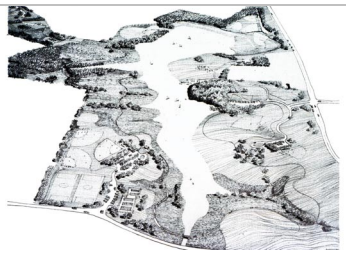
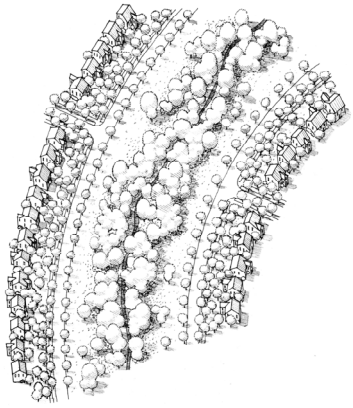
A. Such areas are aligned with an area designated as a public greenway, linear park, or similar facility in a facilities plan officially adopted by the City Council; and

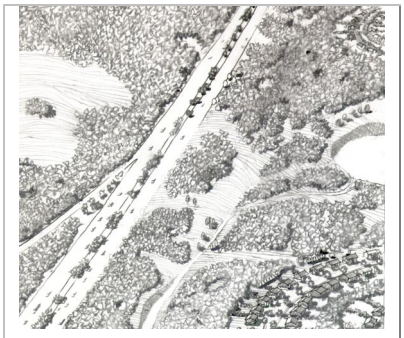
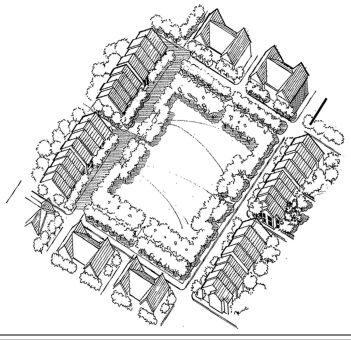
B. Such areas include sidewalks, trails, or similar facilities which align with such facilities in an adjoining tract or, where adjoining tracts are unimproved, conform to the specifications set forth in the facilities plan.

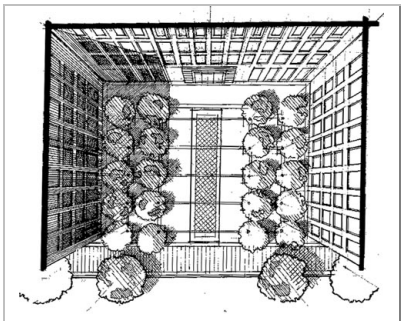
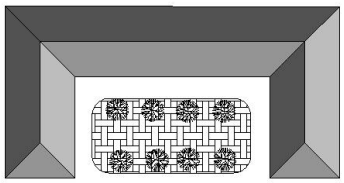
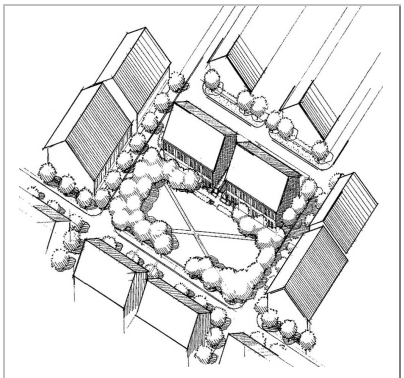
(2) Parks or Open Space provided pursuant to this subsection shall be credited toward the minimum park and open space area requirements at a ratio of one (1) acre for every 20,000 square feet provided, where:

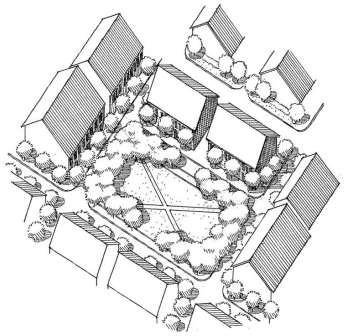
A. all lots within the proposed subdivision are within one-quarter (1/4) mile of the park or open space, and

B. the park or open space area adjoins an area zoned “NC”, “C-1,” “TOD” or the area designated as a “Center” in a Traditional Neighborhood Development.Table 503-2: Park and Open Space Categories

(A) Park or Open Space Cate-gory	(B) Description	(C) Maintenance Requirements	(D) Illustration
Natural Areas and Agricultural Areas	Natural Areas are areas established for the protection of natural attributes of local, regional, and statewide significance, which may be used in a sustainable manner for scientific research, education, aesthetic enjoyment, and appropriate use not detrimental to the primary purpose. These areas are resource rather than user-based, but may provide some passive recreational activities such as hiking, nature study, and picnicking. Natural Areas may include floodplains mapped by FEMA with a drainage area exceeding 300 acres, or creeks with a drainage area of less than 300 acres.	Maintenance is limited to a minimum removal and avoidance of hazards, nuisances, or unhealthy conditions. Natural water courses shall be maintained as free-flowing and devoid of debris. Stream channels shall be maintained so as not to alter floodplain levels.	
Greenways	Greenways are areas connecting residences and recreational areas. Greenways are designed to incorporate natural settings such as creeks and significant stands of trees within neighborhoods. Parkways and greenways differ from parks, plazas and squares in that their detailing is natural (i.e. informally planted) except along rights-of-way, and may contain irregular topography.	A Greenway may be counted as Open Space provided, however, that: (1) the greenway shall have an average width of not less than fifty (50) feet; and (2) if the greenway consists of agricultural areas, the agricultural areas shall have a continuous area of not less than fifty (50) acres. The agricultural areas may be combined with adjacent agricultural lands provided, however, that the minimum width prescribed above shall be met on all portions of the agricultural greenbelt on the site.	

(A) Park or Open Space Cate-gory	(B) Description	(C) Maintenance Requirements	(D) Illustration
Greenbelts	Greenbelts run along the perimeter of a neighborhood, and serve to buffer a neighborhood from surrounding non-compatible uses such as a highway corridor or industrial district, or from agricultural areas or adjacent neighborhoods. Greenbelts differ from the other types of open spaces in that they are left natural, and are not for recreational use.	There is no tree planting requirement along rights-of-way for greenbelts. The following uses are permitted within the greenbelt: (1) Critical Areas, (2) Conservancy Lots with a minimum lot size of five (5) acres and a maximum impervious surface ratio of five percent (5%), or (3) linear parks improved with trails, benches, and/or playground equipment. Trails, benches and playground equipment shall not be considered impervious surfaces for purposes of computing impervious surface. The Greenbelt shall be an average of not less than one-hundred (100) feet in width and not less than fifty (50) feet at any point.	
Playgrounds	Playgrounds provide play areas for children as well as open shelter with benches for parents. Playgrounds may be built within squares and parks or may stand alone within a residential block.	Minimum Size: 5,000 square feet Maximum Size: 20,000 square feet Playing surfaces may be covered in sand, wood chips, or other equivalent material. Paths and walkways may be paved in concrete, crushed gravel, brick paver, or similar material, or partially paved.	
Plazas	Plazas are areas for passive recreational use which are entirely bounded by Streets and/or lanes. Plazas are intended for master planned communities such as Planned Unit Developments (PUD's), or Traditional Neighborhood Developments (TND's), or for non-residential Use Patterns defined in Article 2 (Commercial Centers, Office or Institutional Campuses, and Commercial Retrofits).	The plaza shall be square or rectangular with a length of not less that one and a half its width. The plaza shall be bounded on all sides by Streets, with Streets originating in the middle of each side, and two Streets originating from each corner. Minimum width: 200 feet Minimum length: 300 feet Maximum width: 530 feet Maximum length: 800 feet	

(A) Park or Open Space Cate-gory	(B) Description	(C) Maintenance Requirements	(D) Illustration
Courtyard	A Courtyard is an open area adjacent to, or part of, a civic building or facility. Courtyards function as gathering places and may incorporate a variety of non-permanent activities such as vendors and display stands. Courtyards shall be credited toward Parks and Open Space requirements only for non-residential Use Patterns defined in Article 2 (Commercial Centers, Office or Institutional Campuses, and Commercial Retrofits), and shall be maintained in private ownership.	Parking is permitted only at the edge of the Courtyard. Courtyards shall be paved in brick or other type of paver, or crushed stone. Courtyards shall be level, stepped, or gently sloping (less than 5% grade). At no time shall a Courtyard's horizontal length or width be greater than 3 times the height of the surrounding building(s). Minimum size: 2,000 sq ft Maximum size: 30,000 sq ft Courtyards may be left unplanted. If planted, the trees shall frame the Courtyard space or the structure which the Courtyard services. Tree spacing shall be a maximum of 25 feet on center.	
Forecourt	Forecourts are open space areas which act as buffers between residential and non-residential buildings or Streets. Forecourts shall be credited toward Parks and Open Space requirements only for non-residential Use Patterns defined in Article 2 (Commercial Centers, Office or Institutional Campuses, and Commercial Retrofits), and shall be maintained in private ownership.	Forecourts shall be entirely bounded by Streets and shall be planted parallel to all Street right-of-ways with one tree species.	
Attached Squares	Attached Squares are areas for passive recreational use which are internal to a block.	Squares shall be bounded by Streets on a minimum of three sides or 75% of their perimeter. Squares may be bounded by buildings on a maximum of 60% of their perimeter (maximum of 2 sides) in order to provide a central gathering area for the community. Squares shall be planted parallel to all rights-of-way with at least two (2) tree species a minimum of 10 feet and a maximum of 50 feet on center. All internal tree plantings (if provided) shall be in geometrical layouts. Minimum size: 2000 square feet Maximum size: 1 acre	

(A) Park or Open Space Cate-gory	(B) Description	(C) Maintenance Requirements	(D) Illustration
Detached Square	Detached squares bordered on all sides by roads are particularly formal. Since adjacent buildings provide much of the population using any public space, detached squares are less likely to be used than other types though it remains appropriate as a means to symbolically enhance important places, intersections, or centers.	Detached Squares shall be planted along the perimeter of the Plaza or may be used to preserve a specimen tree or small stand of trees. The geometric pattern of the Square shall be square or a rectangle with a length not exceeding twice the width. Minimum Size: 200 sq ft Maximum Size: 1 acre	
Green	The green is an urban open space which is natural in its details. Like the square, it is small, civic, and surrounded by buildings. Unlike the square, it is informally planted and may have irregular topography.	Greens shall be landscaped with trees at the edges and open lawns at the center. Greens shall contain no structures other than benches, pavilions, and memorials. Trails or pedestrian pathways are optional.	

(A) Park or Open Space Cate-gory	(B) Description	(C) Maintenance Requirements	(D) Illustration
Park	Parks may be designed for active recreational use. Parks create a central open space which services an entire neighborhood or group of neighborhoods, or incorporate physical features which are an asset to the community (i.e. lake or river frontage, high ground, or significant stands of trees). Parks may be combined with parkways and greenbelts. Parks shall include at least three (3) of the facilities listed in the "Basic Facilities Menu" for Neighborhood Parks in the Parks and Recreation System Plan (page 230).	Parks shall be bounded by Streets on a minimum of 50% of their perimeter (subject to lot line configurations). Minimum size: 1 acre Trees shall be planted parallel to all perimeter rights-of-way with one species type, a minimum of 15 feet to a maximum of 50 feet on center. Promenades, and Esplanades within a park may be formally planted with trees parallel to the walkway. Areas under dense tree plantings shall be paved with crushed gravel. Interior portions of parks may be kept free of tree plantings. Areas for active recreational use and any facilities which accompany such use shall have a tree planting design which integrates the structures into the park and defines the areas set aside for active use from areas of passive use. Plantings in interior portions of parks are encouraged to follow topographical lines.	
Parkway	Parkways are open spaces designed to incorporate natural settings such as creeks and significant stands of trees within neighborhoods. Parkways and greenways differ from parks, plazas and squares in that their detailing is natural (i.e. informally planted) except along rights-of-way, and may contain irregular topography.	Parkways shall be entirely bounded by Streets or pedestrian rights-of-way within developed areas. Parkways may be used for certain active recreational uses such as walking, jogging, or bicycling. Trees shall be planted along all rights-of-way a minimum of 10 feet and a maximum of 50 feet on center, with one species type. Interior areas shall remain natural and any additional plantings shall be informal in design.	

35-504 Storm Water Management

The purpose of this Section is to provide adequate measures for the retention, detention and distribution of stormwater in a manner that minimizes the possibility of adverse impacts on both water quantity and water quality during development. This Section implements the following policies of the Master Plan:

- *Natural Resources, Policy 1d: Encourage retention of the 100-year floodplains as natural drainage ways without permanent construction, unnecessary straightening, bank clearing or channeling.*

- *Natural Resources, Policy 1d: Adopt strong stormwater management practices throughout the drainage area which include site specific measures such as-*

  on-site stormwater retention and detention
  reduction in impervious cover
  natural bank contouring
  floodplain preservation and buffering
  preservation of riparian habitat
  stormwater harvesting sites for reuse purposes

- *Urban Design, Policy 1g: Prepare design and construction policies and standards for utility and transportation infrastructure, capital improvement projects, public facilities and development projects that reinforce neighborhood centers and provide diverse, pedestrian-friendly neighborhoods.*

(a) Applicability

The provisions of this Section shall apply to any application for Subdivision Plat, Master Development Plan, or Building Permit approval except as otherwise provided by this Chapter. A Stormwater Management Plan shall be provided as set forth in Appendix B, § 35-B119 of this Chapter.

(b) Storm Water Management Program

(1) Regional stormwater management program (RSWMP).

A. The City of San Antonio has determined that regional stormwater management is preferable to site specific stormwater mitigation. The regional stormwater management program provides for the administration, planning, design, construction, and operational management of regional storm water facilities (RSWF). Regional storm water management uses a watershed-wide approach to analyze potential flooding problems, identify appropriate mitigation measures and select site locations and design criteria for RSWF. These RSWF include, but are not limited to, regional detention and retention

ponds, watershed protection, land purchase, waterway enlargement, channelization, and improved conveyance structures. The regional storm water management program allows developers to participate in the program rather than constructing the on-site detention controls required by this Section, where the resulting use of a RSWF will not produce a significant adverse impact to other properties due to the increased runoff from the proposed development.

B. Options available to developers to participate in the RSWMP include:

1. Payment of a fee in lieu of on-site detention. The fee schedule is included in Appendix C-109.
2. Construction of a RSWF to mitigate an existing flooding problem.
3. Construction or participation in the construction of a RSWF to mitigate increased storm water runoff anticipated by ultimate development of the watershed.

C. To determine a significant adverse impact for the purposes of this section, the following criteria will be used to analyze the receiving storm water facility for 2000 linear feet downstream of the project or to the nearest downstream RSWF , whichever is less. (The 2000 linear feet is based on an estimate that this length will approximate a 100-acre drainage area. The 100-acre drainage area represents the lower limit for a 100-year frequency storm water facility design.)

1. The design storm water surface elevation (DSE) in the receiving storm water facility may not be increased within the 2000 linear feet from the development unless the increased DSE is contained within an easement or right-of-way or the receiving facility has sufficient capacity to contain the increased DSE without increasing flooding to a habitable structure.
2. Where low water crossings exist within the study area, the DSE cannot be increased above the level of the 100-year ultimate development water surface at the low water crossing. The increase in flow at the low water crossing for the 5, 25 and 100-year frequency design must not reclassify the low water crossing from a safe to a dangerous condition crossing based on Figure 504-2. If the increased DSE exceeds this criterion, the development can improve the low water crossing to the standards of this chapter in lieu of providing for onsite controls or paying a fee.
3. Where a development is upstream of an existing San Antonio River Authority (SARA) flood control facility or other detention facility constructed prior to 2000, an analyses will be provided to insure that capacity exists within the facility to accommodate the increased runoff from the proposed development.
4. The City of San Antonio may reject a developer's request to participate in the RSWMP and require on-site detention. The City's decision will be based on the knowledge of significant adverse impacts that would be created within the watershed by the proposed

development regardless of the distance from the development to the area impacted. The City may also reject a request for participation when it is not in the best interests of the RSWMP. The developer is recommended to meet with the Storm Water Engineering Section of the Storm Water Utility to discuss participation options prior to commencing a project. This preliminary meeting in no way relieves the developer of his responsibility to prepare the necessary engineering documentation to support his request for participation.

D. The storm water development fee in lieu of on-site detention must be paid prior to a plat being released for recordation by the City of San Antonio or the issuance of a building permit. The fee shall be determined in accordance with the provisions of Appendix C of this Code.

(2) System Criteria

A. All Stormwater Management Facilities, or combination of facilities, shall be designed for ultimate development. Facilities with drainage areas under 100 acres shall be designed for a 25-year storm. Facilities with drainage areas over 100 acres or areas within a designated floodplain shall be designed for a 100 year storm or a 25 year storm plus freeboard (based on Table 504-9) if that elevation is higher. Detention facilities and streets are exceptions to the frequency criteria cited above. Detention facility outflows will be designed for 5, 25 and 100-year frequency storms. Refer to § 35-504(g) for specific drainage design criteria for streets.

B. Three development conditions shall be analyzed for each development.

1. Existing Conditions. This refers to current development conditions in the watershed and on site. Use as the baseline analysis for determining the impact of development.
2. Proposed Conditions. This refers to existing conditions with the proposed development added. Use to determine if the increased runoff from the proposed development results in an adverse impact to other properties.
3. Ultimate Conditions. This refers to ultimate development conditions within the watershed. **Use to design the drainage facilities.** This condition may be used in lieu of subsection 2, above, to determine if the increased runoff from the ultimate watershed development results in an adverse impact to other properties.

(3) Responsibility to Accept Stormwater

The owner or developer of property to be developed shall be responsible for the conveyance of all stormwater flowing through the property. This responsibility includes the stormwater flowing onto the property by any other developed property as well as the drainage naturally flowing through the property by reason of topography. Future upstream development shall be accounted for by assuming ultimate development when sizing drainage systems as specified in this Section.

(4) Positive Overflow Pathways

Stormwater Management Facilities for local drainage systems will be designed to ensure that a positive overflow pathway is provided to the nearest 100-year conveyance facility. The overflow pathway must be delineated on a plan that shows all existing structures in the vicinity impacted by the overflow pathway.

(5) Maintenance

A. Maintenance of publicly owned facilities will be the responsibility of the city. Maintenance of private facilities is the responsibility of the property owner or the community association and must be specified in the maintenance schedule submitted to the city. A maintenance schedule for both publicly owned and privately owned facilities must be approved by the Director of Public Works prior to the approval of construction drawings.

B. Authorized personnel from the City of San Antonio shall conduct periodic inspections of these facilities and structures. Any required repairs will be consistent with current construction standards. Maintenance issues identified by the City or State during inspections shall be the responsibility of the current owner.

(6) New development

Peak stormwater runoff rates from all new development shall be less than or equal to the peak runoff rates from the site's predevelopment conditions for the 5-, 25- and 100-year design storm events, except as provided in § 35-504(b)(1), above.

(7) Redevelopment

Peak stormwater runoff rates from an area of redevelopment due to zoning or replatting shall be less than or equal to the peak runoff rates produced by existing development conditions for the 5-, 25- and 100-year design storm events, except as provided in § 35-504(b)(1), above.

(c) Method of computing runoff.

(1) Calculation Methods

A. For drainage areas less than six hundred forty (640) acres, the basis for computing runoff shall be the Rational Formula or some other method provided it is acceptable to the Director of Public Works. Hydraulic calculations shall be performed by using the U.S. Army Corps of Engineers HEC-2 “Water Surface Profiles” or HEC-RAS “River Analysis System” computer models. Normal depth channel calculations are permissible for constructed open channels with a uniform geometric cross section where 1) there is no potential for the water surface elevations to be controlled by backwater and 2) the channel is not in a FEMA floodplain.

B. For drainage areas six hundred forty (640) acres or greater, the basis for computing runoff shall be a unit hydrograph method, preferably the Soil Conservation Service (SCS) Dimensionless Unitgraph method as contained in the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-1 "Flood Hydrograph Package," which document shall be maintained on file with the Director of Public Works and is hereby incorporated by this reference. For the SCS method, antecedent moisture condition II shall be used in the runoff model. Design rainfall values listed in Table 504-4 shall be used for hydrograph calculations.

C. Open channel hydraulic calculations shall be performed by using the U.S. Army Corps of Engineers HEC-2 "Water Surface Profiles" or HEC-RAS "River Analysis System" computer models, which documents shall be maintained on file with the Director of Public Works and is hereby incorporated by this reference.

D. Certain watersheds have hydrologic and hydraulic models that are available through and maintained by the City of San Antonio. Developments proposed within the limits of these watersheds must have the models updated by the consultant to reflect changes in flow, channel configuration (including alterations to vegetation) and channel structures. The consultants' models must use the same computer program that was used in the existing model e.g. HEC-RAS models will not be accepted where the original model used HEC-2. The updated models shall be submitted to the Director of Public Works for incorporation into the master models. The City of San Antonio will periodically update the master models to reflect current watershed development conditions. The updated models will be made available for use and distribution as the latest existing condition models for the watershed.

(2) Time of Concentration

A. Overland (sheet) flow, shallow concentrated flow and channel flows are components that need to be considered in the calculation of time of concentration. The following methods are recommended for time of concentration calculation.

B. Overland flow – flow over plane surfaces: Maximum allowable time is 20 minutes. Minimum is 5 minutes. The Overland Flowtime chart from "Design" by Elwyn E. Seelye may be used to calculate overland flow times. Note that the minimum time has been reduced to 5 minutes.

C. Shallow concentrated flow – overland flow usually becomes shallow concentrated flow after a maximum of 300 feet: Use Manning's equation to estimate travel time for defined swales, bar ditches and street sections, etc. Figure 3-1from TR-55 "Urban Hydrology for Small Watersheds", SCS 1986, may be used where a geometric section has not been defined.

D. Channel flow: Use existing computer models where available or Manning's equation if data is not available. Non-floodplain channel velocities for ultimate

watershed development should not be less than 6 fps when estimating time of concentration.

(3) Runoff Coefficients

Runoff coefficients (C value) for use in the Rational Formula shall not be less than the values shown in Tables 504-1(a) or 504-1(b), as appropriate.

Table 504-1(a) Runoff Coefficients (C) - Percentage

Character of Area	SLOPE			
	Up to 1%	Over 1% up to 3%	Over 3% up to 5%	Flow over 5%
Business or commercial areas (90% or more impervious), Existing Pavement / Buildings or Zoning Districts O, C, I-1, I-2	95	96	97	97
Densely developed areas (80% to 90% impervious) or Zoning Districts D, MX, NC, TOD, Use Pattern TND	85	88	91	95
Closely built residential areas and school sites or Zoning Districts MF, R-4	75	77	80	84
Undeveloped areas * – Present land is undeveloped and ultimate land use is unknown. C values for use in ultimate development calculations.	68	70	72	75
Large lot residential area or Zoning Districts R20, RE	55	57	62	64
Undeveloped areas * – Existing conditions. See Table 504- 1(b)				
Average residential area or Zoning Districts R-5, R-6	65	67	69	72

Table 504-1(b). Runoff Coefficients (C) - Percentage

Character of Area	SLOPE			
	Up to 1%	Over 1% up to 3%	Over 3% up to 5%	Flow over 5%
Cultivated or Range (Grass Cover < 50% of Area)	44	47	53	55
Range (Grass Cover 50-75% of Area)	37	41	49	53
Forest or Range (Grass Cover > 75% of Area)	35	39	47	52

* Areas included within parks, green belts or regulatory floodplains shall be considered to remain undeveloped per Table 504-1(b).

(4) Rainfall Intensity

Use Figure 504-1 or Table 504-2 to determine rainfall intensity.

Table 504-2 Rainfall Intensities (inches / hour)

TIME	FREQUENCY						
MINUTES	**2 YEAR**	**5 YEAR**	**10 YEAR**	**25 YEAR**	**50 YEAR**	**100 YEAR**	**500 YEAR**
1	6.94	8.00	8.84	9.99	11.09	11.92	13.55
2	6.69	7.72	8.53	9.67	10.69	11.53	13.24
3	6.45	7.46	8.24	9.36	10.31	11.15	12.93
4	6.22	7.21	7.95	9.05	9.95	10.79	12.62
5	6.00	6.96	7.68	8.76	9.60	10.44	12.30
6	5.79	6.73	7.42	8.48	9.27	10.10	11.98
7	5.59	6.50	7.17	8.20	8.95	9.78	11.66
8	5.40	6.28	6.93	7.94	8.65	9.47	11.34
9	5.21	6.08	6.70	7.69	8.37	9.17	11.01
10	5.04	5.88	6.48	7.44	8.10	8.88	10.68
11	4.88	5.69	6.27	7.21	7.85	8.61	10.35
12	4.72	5.52	6.08	6.98	7.61	8.35	10.02
13	4.58	5.35	5.89	6.76	7.39	8.10	9.68
14	4.45	5.19	5.72	6.56	7.19	7.86	9.34
15	4.32	5.04	5.56	6.36	7.00	7.64	9.00
16	4.22	4.94	5.46	6.26	6.89	7.53	8.89
17	4.12	4.84	5.36	6.16	6.79	7.42	8.78
18	4.03	4.75	5.27	6.06	6.68	7.31	8.68
19	3.94	4.66	5.17	5.96	6.58	7.20	8.57
20	3.85	4.56	5.08	5.86	6.48	7.09	8.47
21	3.76	4.48	4.99	5.77	6.38	6.99	8.36
22	3.67	4.39	4.90	5.68	6.28	6.88	8.26
23	3.59	4.30	4.82	5.59	6.18	6.78	8.16
24	3.51	4.22	4.73	5.50	6.09	6.68	8.06
25	3.43	4.14	4.65	5.41	6.00	6.58	7.96
26	3.35	4.06	4.57	5.33	5.91	6.49	7.86
27	3.27	3.98	4.49	5.24	5.82	6.39	7.76
28	3.20	3.91	4.41	5.16	5.73	6.30	7.67
29	3.13	3.83	4.33	5.08	5.64	6.21	7.57
30	3.06	3.76	4.26	5.00	5.56	6.12	7.48
31	2.99	3.69	4.19	4.92	5.48	6.03	7.39
32	2.93	3.62	4.12	4.85	5.40	5.95	7.30
33	2.87	3.56	4.05	4.77	5.32	5.86	7.21
34	2.81	3.49	3.98	4.70	5.24	5.78	7.12
35	2.75	3.43	3.92	4.63	5.17	5.70	7.03
36	2.69	3.37	3.86	4.56	5.09	5.62	6.94
37	2.64	3.31	3.80	4.50	5.02	5.54	6.86
38	2.59	3.26	3.74	4.43	4.95	5.47	6.77
39	2.54	3.21	3.68	4.37	4.88	5.40	6.69
40	2.49	3.15	3.62	4.31	4.82	5.32	6.61
41	2.45	3.10	3.57	4.25	4.75	5.25	6.53
42	2.40	3.06	3.52	4.19	4.69	5.19	6.45

TIME	FREQUENCY						
MINUTES	**2 YEAR**	**5 YEAR**	**10 YEAR**	**25 YEAR**	**50 YEAR**	**100 YEAR**	**500 YEAR**
43	2.36	3.01	3.47	4.13	4.63	5.12	6.37
44	2.32	2.97	3.42	4.08	4.57	5.05	6.29
45	2.29	2.92	3.37	4.02	4.51	4.99	6.21
46	2.25	2.88	3.33	3.97	4.45	4.93	6.14
47	2.22	2.85	3.29	3.92	4.40	4.87	6.06
48	2.19	2.81	3.25	3.87	4.34	4.81	5.99
49	2.16	2.78	3.21	3.83	4.29	4.76	5.92
50	2.14	2.74	3.17	3.78	4.24	4.70	5.85
51	2.11	2.71	3.13	3.74	4.19	4.65	5.78
52	2.09	2.69	3.10	3.70	4.15	4.60	5.71
53	2.07	2.66	3.07	3.66	4.10	4.55	5.64
54	2.06	2.63	3.04	3.62	4.06	4.50	5.58
55	2.04	2.61	3.01	3.59	4.02	4.45	5.51
56	2.03	2.59	2.99	3.55	3.98	4.41	5.45
57	2.02	2.57	2.96	3.52	3.94	4.37	5.38
58	2.01	2.56	2.94	3.49	3.91	4.33	5.32
59	2.00	2.54	2.92	3.46	3.87	4.29	5.26
60	2.00	2.53	2.90	3.43	3.84	4.25	5.20
120	1.10	1.54	1.83	2.21	2.50	2.78	3.48
180	0.86	1.19	1.41	1.68	1.88	2.08	2.53
240	0.70	0.97	1.13	1.33	1.50	1.65	1.99
360	0.51	0.71	0.83	0.98	1.09	1.19	1.41
720	0.28	0.39	0.46	0.55	0.61	0.67	0.81
1440	0.165	0.227	0.273	0.324	0.366	0.413	0.513

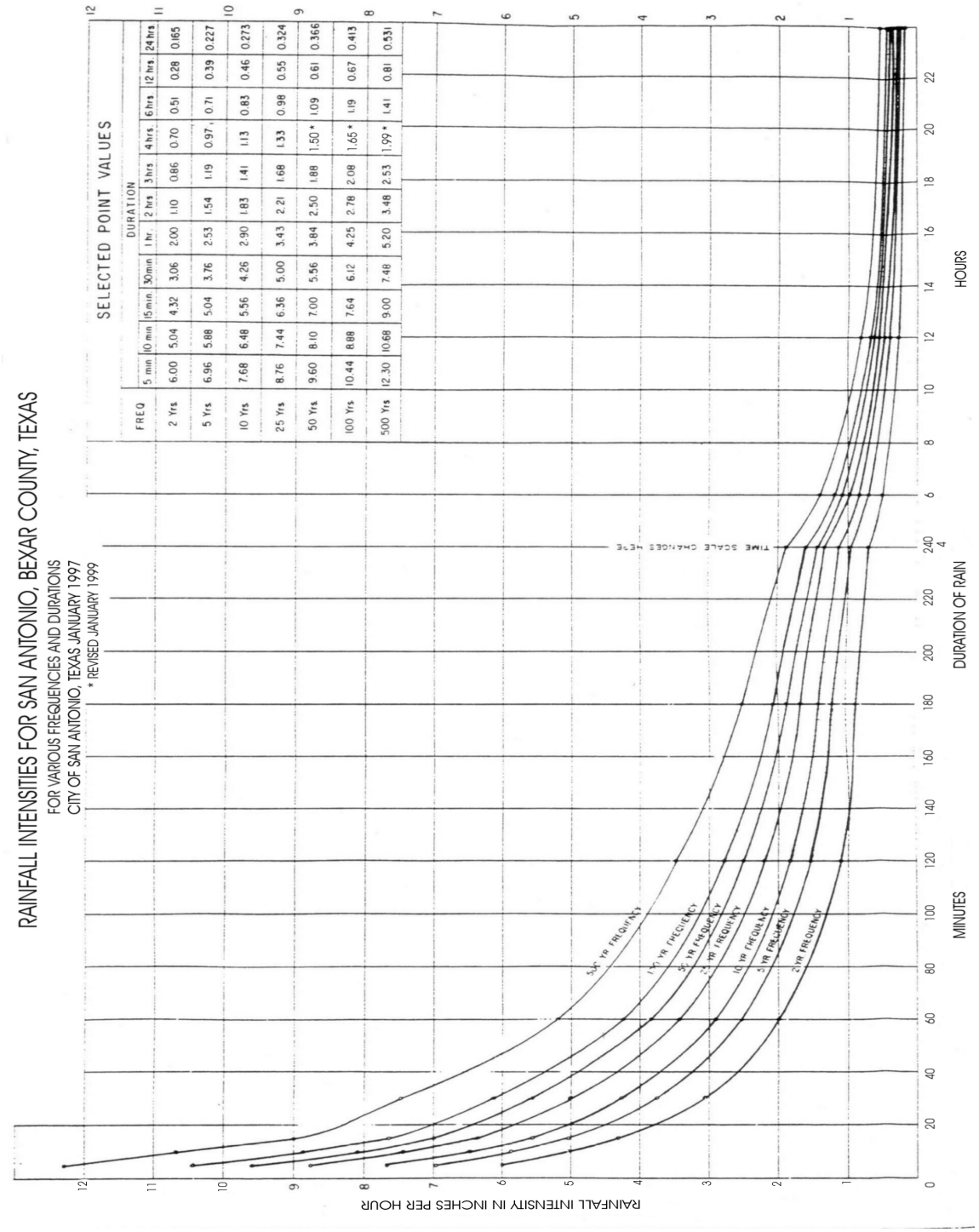

RAINFALL INTENSITIES FOR SAN ANTONIO, BEXAR COUNTY, TEXAS
FOR VARIOUS FREQUENCIES AND DURATIONS
CITY OF SAN ANTONIO, TEXAS JANUARY 1997
* REVISED JANUARY 1999
SELECTED POINT VALUES
DURATION
FREQ | 5 min | 10 min | 15 min | 30min | 1 hr. | 2 hrs | 3 hrs | 4 hrs. | 6 hrs | 12 hrs | 24 hrs
2 Yrs | 6.00 | 5.04 | 4.32 | 3.06 | 2.00 | 1.10 | 0.86 | 0.70 | 0.51 | 0.28 | 0.165
5 Yrs | 6.96 | 5.88 | 5.04 | 3.76 | 2.53 | 1.54 | 1.19 | 0.97 | 0.71 | 0.39 | 0.227
10 Yrs | 7.68 | 6.48 | 5.56 | 4.26 | 2.90 | 1.83 | 1.41 | 1.13 | 0.83 | 0.46 | 0.273
25 Yrs | 8.76 | 7.44 | 6.36 | 5.00 | 3.43 | 2.21 | 1.68 | 1.33 | 0.98 | 0.55 | 0.324
50 Yrs | 9.60 | 8.10 | 7.00 | 5.56 | 3.84 | 2.50 | 1.88 | 1.50 * | 1.09 | 0.61 | 0.366
100 Yrs | 10.44 | 8.88 | 7.64 | 6.12 | 4.25 | 2.78 | 2.08 | 1.65 * | 1.19 | 0.67 | 0.413
500 Yrs | 12.30 | 10.68 | 9.00 | 7.48 | 5.20 | 3.48 | 2.53 | 1.99 * | 1.41 | 0.81 | 0.531
TIME SCALE CHANGES HERE
100 YR FREQUENCY
50 YR FREQUENCY
25 YR FREQUENCY
10 YR FREQUENCY
5 YR FREQUENCY
2 YR FREQUENCY
RAINFALL INTENSITY IN INCHES PER HOUR
DURATION OF RAIN
MINUTES
HOURS

Figure 504-1

(5) SCS Curve Numbers

The SCS Curve Numbers adopted for use by the City of San Antonio are shown in Table 504-3. The hydrologic soil groups are listed in the latest version of the United States Natural Resources Conservation Service [formerly the Soil Conservation Service], "Urban Hydrology for Small Watersheds", Technical Release No. 55 (TR 55) which document is hereby incorporated by this reference. Soil types that relate to the hydrologic soil group may be found in the latest version of the United States Natural Resources Conservation Service "Soil Survey-Bexar County, Texas" which document is hereby incorporated by this reference. Soil types may also be based on a Geotechnical Engineering Report.

Table 504-3
SCS Curve Number by Soil Type

Hydrologic Soil Group	*Description*	*SCS Curve Number*
A	Soils having a low runoff potential due to high infiltration rates. These soils consist primarily of deep, well drained sand and gravels.	25
B	Soils having a moderately low runoff potential due to moderate infiltration rates. These soils consist primarily of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.	55
C	Soils having moderately high runoff potential due to slow infiltration rates. These soils consist primarily of soils in which a layer exists near the surface that impedes the downward movement of water or soils with moderately fine to fine texture.	70
D	Soils having a high runoff potential due to very slow infiltration rates. These soils consist primarily of clays with high swelling potential, soils with permanently high water tables, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious parent material.	77

(6) Percent Impervious Cover

The percent impervious cover for typical land use types in San Antonio are presented in Table 504-4.

Table 504-4
Percent Impervious Cover by Land Use

Land Use Category		Average Percent Impervious Cover
Residential	1/8 acre Residential Lots, or Garden or Townhouse apartments, or Zoning Districts R-4, R-5, RM-4, RM-5; TND/TOD Use Patterns	65-85%
	¼ acre Residential Lots or Zoning District R-6, RM-6	38%
	1/3 acre Residential Lots or Zoning District R-15	30%
	½ acre Residential Lots or Zoning Districts R-20	25%
	1 acre Residential Lots or Zoning DistrictsRP, RE	20%
Industrial or Zoning Districts L, I-1, I-2		72-85%
Business or Commercial, or Zoning Districts NC, O, C		85-95%
Densely developed (apartments), or Zoning Districts MF		65-85%
Streets, Roads, and Parking Areas		98%

(7) Design Rainfall

A twenty-four-hour rainfall distribution shall be applied for runoff calculations. Rainfall intensities as adopted for the City of San Antonio are given in Table 504-5 and should be used for HEC-1 input. The lag value for a subarea shall be calculated as 0.6 times the time of concentration.

Table 504-5
Design Rainfall Values (inches)

Duration	Frequency					
	5-year	10-year	25-year	50-year	100-year	500-year
5 minute	0.58	0.64	0.73	0.8	0.87	1.03
15 minute	1.26	1.39	1.59	1.75	1.91	2.25
60 minute	2.53	2.9	3.43	3.84	4.25	5.2
2 hour	3.08	3.66	4.42	4.99	5.57	6.95
3 hour	3.57	4.23	5.04	5.64	6.23	7.6
6 hour	4.26	4.99	5.89	6.52	7.13	8.47
12 hour	4.68	5.55	6.58	7.32	8.05	9.68
24 hour	5.45	6.55	7.78	8.78	9.91	12.75

(8) Routing of runoff

Routing of the runoff hydrograph through the channel from one subarea calculation point to the next in the HEC-1 shall be computed using one of the following methods:

A. Overbank/Channel storage not significant: Use Normal depth channel routing.

B. Overbank/Channel storage is significant: Use the Muskingum method where a hydraulic model is not available. Use Modified Puls Storage method where a hydraulic model is available to develop storage/out flow relationship.

C. Kinematic wave method□□For channel reaches where inflow from overbank runoff or multiple point sources (Example: storm sewer outfalls) is significant and where hydrograph attenuation is insignificant.

Channel routing methodologies currently being applied in the existing HEC-1 model of the watershed shall not be replaced with a different methodology without approval or direction from the Director of Public Works.

(9) Manning's Roughness Coefficient

Manning's roughness coefficients ("n" values) for use in routing methods or in hydraulic calculations shall be consistent with the values listed in Table 504-6

Table 504-6
Manning's Roughness Coefficient

Channel Description	Manning's "n" Value
Concrete Lined Channel	0.015
Grass Lined Channel with regular maintenance	0.035
Grass Lined Channel without recent maintenance	0.050
Vegetated Channel with trees, little or no underbrush	0.055
Natural Channel with trees, moderate underbrush	0.075
Natural Channel with trees, dense underbrush	0.090
Natural Channel with dense trees and dense underbrush	0.100

Overbank Description	Manning's "n" Value
Pasture	0.035-0.055
Trees, little or no underbrush, scattered structures	0.060-0.075
Dense vegetation, multiple fences and structures	0.075-0.090

The N value to be used in Manning's Formula shall conform to the following for design purposes:

A. Earth channels--0.035
B. Concrete lined channels--0.015
C. Reinforced concrete pipe--0.013
D. Concrete box culverts--0.013
E. Corrugated metal pipe:
F. Unpaved 1/2" corrugated--0.024
G. Unpaved 1" corrugated--0.027

Any other N value shall be based on generally accepted engineering principles.

(d) Drainage easements / Rights-of-way.

(1) Applicability

Where a subdivision is traversed by a watercourse, drainageway, natural channel or stream, there shall be provided an easement or right-of-way conforming substantially to the limit of such watercourse, plus additional width as outlined below.

(2) Requirements

Easement or right-of-way requirements are specified in the following subsections of this Section for particular Stormwater Management facilities –

A. (d)(3) Natural Watercourses or Floodplains
B. (f)(3) Regional Detention Facilities
C. (h)(6)(e) Concrete Lined Channels
D. (h)(7)(c) & (d) Vegetated Earth Channels
E. (i)(c) Storm Sewers

(3) Natural Watercourses or Floodplains

Easements for natural watercourses shall be the 100-year floodplain or the 25-year plus freeboard (see Table 504-9 of this Section) whichever is greater. In floodplain areas where ongoing maintenance is required or the floodplain will be reserved for use by the public, the drainage easements shall be maintained by or a public entity and the property will be dedicated to the city as a multi-use drainage easement. A driveable access way shall be provided in floodplain easements for the length of the easement when regular maintenance of the floodplain is required.

(4) Maintenance Access Right-of-Way

An unobstructed access right-of-way connecting the drainage easement with an alley or roadway parallel to or near the easement shall be provided at a minimum spacing of one access right-of-way at approximately one-thousand (1000) foot intervals. The access right-of-way shall be a minimum of fifteen (15) feet in width and shall be maintained clear of obstructions that would limit maintenance vehicular access. If the flow line of the designed channel incorporates grade control structures or vehicular bridges that would prevent maintenance equipment from accessing that portion of the channel, additional access points may be required. Channel design, earthen or concrete, shall have ramps in the side slopes near the access points that would allow maintenance equipment to descend to the floor level of the channel. The maximum allowable ramp slope for vehicular access is 7:1. Access points adjacent to roadways or alleys shall be provided with a post and cable feature with padlock to prevent unauthorized use.

(5) Lot and Property Line Crossings

In those cases where drainage easements cross lot and property lines, a statement shall be added to the plat that no fencing or structures that will interfere with adequate drainage flow will be allowed on or across such lines. Fencing may be allowed across drainage easements only in accordance with the following restrictions:

A. Bottom of fence shall be a minimum of the flow depth, plus freeboard (see Table 504-9 of this Section) above design flow line of channel or drain.

B. A hinged gate will be placed across the entire width of the drainage easement.

C. Fence posts located within the easement must be structurally designed to resist damage from the storm water flows and impact from debris.

D. A floodplain development permit will be required to construct a fence within an easement within the 100-year floodplain.

(6) Interceptor easements

Interceptor drainage easements and channels shall be provided where the drainage area to the back of platted lots exceeds the depth of two average residential lots. Interceptor drains shall be constructed prior to the issuing of building permits on any lot that would be affected by natural drainage being intercepted.

(7) Lower elevation of Site

All developments shall provide for adequate drainage outfall at the lower end of the site into an existing street, alley, drainage, easements or right-of-way, or to the centerline of an existing natural drain. Where proposed street, storm sewer, or open channel does not discharge into a natural low or into an existing adequate drainage easement then facilities and drainage easements of adequate width to contain the design discharge shall be constructed and dedicated to the centerline of an existing natural low within the same watershed. However, where the natural low lies within the developer's property, the developer will be required only to plat an easement to the centerline of the natural low, provided that the easement is adequate to accommodate the facilities that will be built in conjunction with the future development of that property.

(e) Site Design and Grading

(1) All land disturbing or land filling activities or soil storage shall be undertaken in a manner designed to minimize surface runoff, erosion and sedimentation, and to safeguard life, limb, property and the public welfare in accordance with the NPDES (TPDES) Construction Site Regulation Ordinance, Ordinance No. _____, as amended, and the document entitled "Complying with the Edwards Aquifer Rules; Technical Guidance on Best Management Practices, " by Michael E. Barrett, Ph.D., P.E. Center for Research in Water Resources, Bureau of Engineering Research, University of Texas at Austin, (RG-348, June 1999), which documents are hereby incorporated by this reference.

(2) A note must be placed on the plat for residential lots, which states that finished floor elevations must be a minimum of eight (8) inches above final adjacent grade. A grading plan shall be prepared and submitted to the City of San Antonio, which indicates typical lot grading for all lots in the subdivision using typical FHA lot grading types (A, B & C). A more detailed grading plan is also acceptable. No more than two average residential lots may drain onto another lot unless a drainage easement is dedicated to contain the runoff.

(f) Stormwater detention

For projects with an increased impervious area of greater than 0.1 acres, that elect not to participate or are not eligible to participate in the Regional Storm Water Management Program as described in Section 35-504 (b)(1), then storm water detention shall be required for all new developments or redevelopment of individual parcels of property to mitigate peak flow rates to

predevelopment or existing development conditions as stated in subsections (b)(6) and (b)(7) of this Section.

(1) Maximum outflow rate

The maximum allowable outflow rate from the detention facility must be restricted to the flow rate from the undeveloped or existing development tract for the 5-, 25- and 100- year frequency. Best management practices shall be used in the design of detention facilities in accordance with this Section. The timing of the hydrograph released from the detention facility must be checked against the timing of the flow rate in the first open watercourse to prevent any increase in the peak flow rate in the receiving watercourse. For detention basins constructed in-line on an existing watercourse, the creation of the basin shall not increase flood elevations in the channel upstream of the new development boundaries.

(2) On-site detention

On-site detention facilities must be privately owned and shall be maintained by the community association or property owner. A maintenance schedule shall be submitted to the public works department and approved by the Director of Public Works prior to approval of construction plans. The City of San Antonio will have the right to do periodic inspections of privately owned and maintained detention facilities to ensure that the maintenance schedule is being implemented.

Where a detention facility accepts flows from public facilities such as City right-of-ways, the detention facility will be considered a detention facility serving a public purpose and will be dedicated to the City upon completion and a drainage easement will be dedicated to provide for access to the facility. When a detention facility accepts flow from an area exceeding 300 acres, the facility will be considered a regional facility serving a public purpose and may be dedicated to the City.

(3) Regional Detention Facilities

A. General locations and sizes of regional detention facilities have been identified in the master drainage plan for the major watersheds in the city's jurisdiction. The ownership of regional detention facilities may either be public or private. The creation of regional detention facilities designed to service one or several developments is encouraged, but not required. In watersheds where public regional detention facilities exist, mitigation of increased storm water runoff from new construction may utilize these facilities if the new construction is eligible to participate in the RSWMP. Temporary detention may be required for the development until sufficient capacity in the outfall channel is provided to accommodate increased flows. Maintenance of publicly owned facilities will be the responsibility of the city. Maintenance of private facilities is the responsibility of the property owner or the community association and must be specified in the maintenance schedule submitted to the city. A maintenance schedule for both publicly owned and privately owned facilities must be approved by the Director of Public Works prior to approval of construction drawings.

B. Drainage easements will be provided for all regional detention facilities. The easement will encompass the 100-year pool elevation plus all structural improvements (levees, dykes, berms, outfall structures etc.) necessary to contain the pool. The easement will extend, at a minimum, to the toe of the downstream embankment. Maintenance access (15' minimum) will be provided around the facility, outside the limits of the 100-year pool elevation. Ramps, as necessary, with a maximum slope of 7:1 will be provided for access to the flowline of the facility.

(4) Multi-Use Facilities

Multi-use facilities are encouraged, but not required (Multi-use facilities allows for water quality, satisfy NPDES requirements, enhance around water recharge, provide open space, provide recreation or other amenities, and/or provide habitat) and may be utilized so long as the facility meets the standards set forth in subsection (a) of this Section and does not increase the rate or volume of erosion above that which would result from the use of a facility without multiple uses. The use of multi-use detention facilities to alleviate existing flooding problems, enhance and provide amenities for older neighborhoods, and support the revitalization of economically depressed areas is encouraged in public and private redevelopment initiatives.

(5) Permanent Wet Pool Or Pumped Detention Systems

Stormwater retention with permanent wet pool or pumped detention systems will not be acceptable methods of stormwater mitigation unless the facility will remain privately owned, operated, and maintained. The city will approve the use of a pumped facility for private use under the following conditions:

A. A gravity system is not feasible from an engineering and economic standpoint.
B. At least two (2) pumps are provided each of which is sized to pump the design flow rate;
C. The selected design outflow rate must not aggravate downstream flooding.
D. Controls and pumps shall be designed to prevent unauthorized operation and vandalism.
E. Adequate assurance is provided that the system will be operated and maintained on a continuous basis.

(6) Location of Detention Facilities and Surrounding Development

Stormwater detention facilities shall be located in topographically depressed areas where possible. When necessary, dams may be constructed to detain flows. All proposed dams shall conform to the following items:

A. All dams over six (6) feet above existing natural around shall be approved by the Dam Safety Team of the TNRCC for safety. All other new dams shall be designed in accordance with acceptable design criteria as approved by the Director of Public Works, or his authorized representative.

B. All hydrology and hydraulic properties of a dam will be reviewed by the department of public works with regard to spillway design, freeboard hydraulics, backwater curves and downstream effects due to the dam site.

C. The spillway section of any earthen dam with a height greater than six (6) feet shall be large enough to pass a PMP (probable maximum precipitation) flood, as defined by the NRCS, without overtopping the crest of the dam in accordance with TNRCC regulations.

D. A 100-year frequency flood shall be routed through the proposed dam and all land subject to flooding shall be dedicated as drainage easement or right-of-way. An unobstructed fifteen-foot access easement around the periphery of the flooded area shall be dedicated as drainage easement for facilities that require regular mowing or other ongoing maintenance, at the discretion of the Director of Public Works. An unobstructed fifteen (15) feet access right-of-way shall be established which connects the drainage easement adjacent to the dam structure to a road or alley.

E. Development below existing dams will take into account the original design conditions of the existing dam. Dam breach analysis checks will be required, dependent upon location of development with respect to dam site.

F. All spillway discharges shall be adequately routed to the centerline of the natural low below the dam site. The adequate routing of spillway discharges pertains to the hydraulic routing of the 100-year frequency flood for dedication of drainage easement limits. Probable Maximum Precipitation (PMP) defined PMP on definition section flood routing or breaches will only be considered for safety considerations (that is, the placement of building and the setting of minimum floor slab elevations below the dams). Any proposed concrete dam structure need not have spillway capable of routing a PMP flood, however, it shall be shown to be structurally capable of withstanding any range of flood conditions with regard to possible failure due to sliding, overturning, and structural integrity, up to and including the PMP flood.

(g) Streets

(1) Generally

A. Design of streets shall consider public safety and limit potential conflicts between stormwater conveyance, traffic, parking, pedestrian access, ADA requirements, and bicycle traffic.

B. Streets draining a watershed greater than 100-acres must be designed for the 100-year frequency storm.

C. Streets may be used for storm water drainage only if the calculated storm water flow does not exceed the flows outlined in Table 504-6 or the velocity does not exceed ten (10) feet per second.

D. Where Streets are not capable of carrying storm waters, as outlined above, inlets or curb openings discharging to drainage channels or storm sewers shall be provided. Partial flow past the inlet will be allowed when the capacity of all downstream Street systems can accommodate the flow.

E. Street width shall not be widened beyond the width as determined by the Street classification for drainage purposes.

F. Stormwater conveyance on Streets shall be designed to account for the cumulative impact of peak flows and runoff volumes on the system as it progresses downgrade.

G. Curb cuts for driveways on all Streets shall be designed for compatibility with the stormwater conveyance function of Streets.

H. Potential flooding problems or conflicts at the connection points where new or modified drainage systems (including Streets, storm sewers, etc.) and the existing portions of the downstream Street system and stormwater conveyance system shall be identified and resolved either in the design of the new or modified drainage system or in modifications to the existing system.

I. Dwelling Units located on the downhill side of a T-intersection with a Street or drainage channel discharging onto the intersection shall be sited so as to avoid obstruction of the drainage patterns.

(2) Primary and Secondary Arterial Streets

An arterial street is a street so designated on the current major thoroughfare plan. One lane in each direction on arterial streets shall remain passable with a flow depth not to exceed 0.30 feet during a 25-year storm event. The maximum depth of water in the street section must not exceed seven (7) inches (the height of a standard city curb).

(3) Local "B" and Collector Streets

A maximum flow depth to the top of curb on a standard local "B" and collector street section will be allowed during a 25-year storm event. A collector street is a street with a width of forty-four (44) feet or more and not shown as an arterial street on the current major thoroughfare plan.

(4) Local "A" Streets

Local "A" Streets shall be designed on a basis of a five (5) year frequency. A 25-year frequency storm must be contained within the street right-of-way.

(5) Alleys

Alleys shall be designed for five (5) year frequency within the limits of the alley pavement / curbs and twenty-five (25) year frequency within the right-of-way/easement to carry storm water.

(6) Traditional Street Design

Traditional street design shall conform to the storm frequency requirements of the standard street designs listed above as follows:

A. Trails, Alleys and Lanes – Use Alley design criteria.
B. Local Street or Avenue – Use Local (A) Street design criteria.
C. Main Street– Use Local (A), Local (B) or Collector Street design criteria depending on the pavement widths. Use Local (A) criteria where pavement width is less than 34'.
D. Boulevard or Parkway – Use Arterial Street design criteria.

No flow capacity Tables are provided for the Traditional Street Designs due the variety of geometric properties associated with these streets. Drainage calculations specific to a proposed Traditional Street Design must be submitted for approval with every project where a Traditional Street Design is proposed.

(7) All-Weather Crossings

A. Where Streets cross existing or proposed watercourses, all weather crossings shall be required. Culverts or bridges shall be adequate to allow passage of the design storm identified in Section 35-504(b)(1)

B. All crossings, culverts and bridges shall be designed for an H-20-44 or HS-20 loading.

C. Dangerous conditions for existing crossings are defined by Figure 504-2 (Dangerous Conditions on Crossing During Floods).

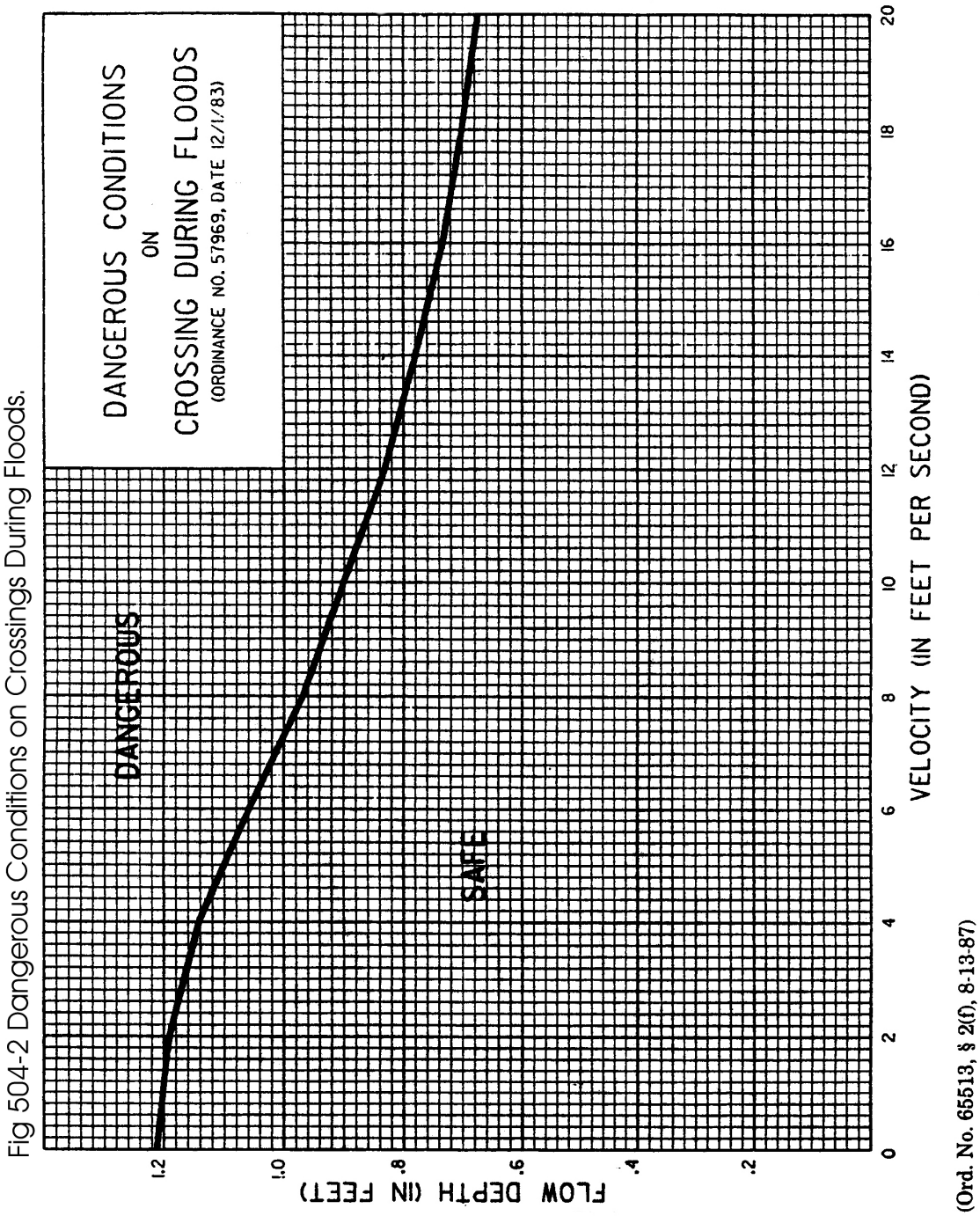
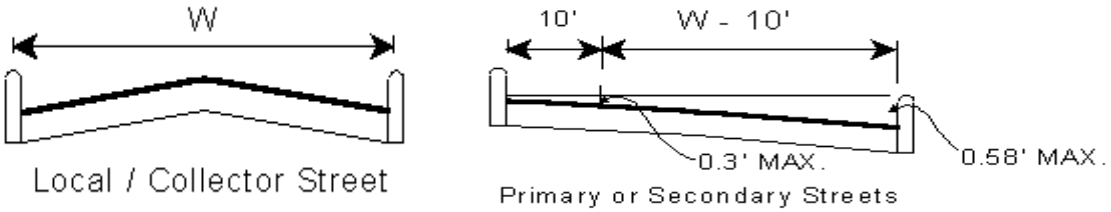


Fig 504-2 Dangerous Conditions on Crossings During Floods.

(Ord. No. 65513, § 2(f), 8-13-87)

Figure 504-2

Table 504-6
Storm Drainage, Street Velocities & Capacities, Manning's N=0.018



STORM DRAINAGE
STREET VELOCITIES AND CAPACITIES
Manning's n=0.018

Slope %	LOCAL TYPE "A" W= 30'		LOCAL TYPE "B" W=40'		COLLECTOR W=44'		SECONDARY (W/MEDIAN) Maximum Water Depth = 7" W=24' Min. and 29' Max.		PRIMARY & Secondary (W/O MEDIAN) Maximum Water Depth = 7" W=24' Min. and 29' Max.	
	Q cfs	V f/s	Q cfs	V f/s	Q cfs	V f/s	Q cfs	V f/s	Q cfs	V f/s
0.40	35.4	2.8	47.8	2.9	44.1	2.7	20.6	2.5	19.2	2.3
0.45	37.5	3.0	50.7	3.0	46.8	2.8	21.9	2.7	20.4	2.4
0.50	39.6	3.2	53.4	3.2	49.3	3.0	23.1	2.8	21.5	2.5
0.55	41.5	3.3	56.0	3.4	51.7	3.1	24.2	2.9	22.5	2.7
0.60	43.3	3.5	58.5	3.5	54.0	3.3	25.3	3.1	23.6	2.8
0.65	45.1	3.6	60.9	3.7	56.2	3.4	26.3	3.2	24.5	2.9
0.70	46.8	3.8	63.2	3.8	58.4	3.5	27.3	3.3	25.4	3.0
0.75	48.5	3.9	65.4	3.9	60.4	3.7	28.3	3.4	26.3	3.1
0.80	50.0	4.0	67.6	4.1	62.4	3.8	29.2	3.5	27.2	3.2
0.85	51.6	4.1	69.6	4.2	64.3	3.9	30.1	3.7	28.0	3.3
0.90	53.1	4.3	71.7	4.3	66.2	4.0	30.9	3.8	28.8	3.4
0.95	54.5	4.4	73.6	4.4	68.0	4.1	31.8	3.9	29.6	3.5
1.00	55.9	4.5	75.5	4.5	69.8	4.2	32.6	4.0	30.4	3.6
1.50	68.5	5.5	92.5	5.5	85.4	5.2	40.0	4.9	37.2	4.4
2.00	79.1	6.4	106.8	6.4	98.6	6.0	46.1	5.6	43.0	5.1
2.50	88.5	7.1	119.4	7.2	110.3	6.7	51.6	6.3	48.1	5.7
3.00	96.9	7.8	130.8	7.8	120.8	7.3	56.5	6.9	52.7	6.2
3.50	104.7	8.4	141.3	8.5	130.5	7.9	61.0	7.4	56.9	6.7
4.00	111.9	9.0	151.1	9.1	139.5	8.5	65.2	7.9	60.8	7.2
4.50	118.7	9.5	160.2	9.6	148.0	9.0	69.2	8.4	64.5	7.6
5.00	125.1	10.0	168.9	10.0	156.0	9.5	72.9	8.9	68.0	8.0
5.50	116.0	10.0	153.0	10.0	163.6	9.9	76.5	9.3	71.3	8.4
6.00	108.0	10.0	143.0	10.0	157.0	10.0	79.9	9.7	74.5	8.8
6.50	102.0	10.0	134.0	10.0	148.0	10.0	81.0	10.0	77.5	9.1

Slope %	LOCAL TYPE "A" W= 30'		LOCAL TYPE "B" W=40'		COLLECTOR W=44'		SECONDARY (W/MEDIAN) Maximum Water Depth = 7" W=24' Min. and 29' Max.		PRIMARY & Secondary (W/O MEDIAN) Maximum Water Depth = 7" W=24' Min. and 29' Max.	
	Q cfs	V f/s	Q cfs	V f/s	Q cfs	V f/s	Q cfs	V f/s	Q cfs	V f/s
7.00	96.0	10.0	127.0	10.0	140.0	10.0	76.0	10.0	80.4	9.5
7.50	91.0	10.0	120.0	10.0	132.0	10.0				
8.00	87.0	10.0	115.0	10.0	126.0	10.0				
8.50	83.0	10.0	110.0	10.0	120.0	10.0				
9.00	79.0	10.0	105.0	10.0	115.0	10.0				
9.5	76.0	10.0	101.0	10.0	111.0	10.0				
10	73.0	10.0	97.0	10.0	106.0	10.0				

W = Width of ponded water.

(h) Drainage channels and watercourses.

This section addresses proposed improvements or modifications to drainage channels and watercourses required to convey stormwater runoff from or through the proposed development Refer to Section 35-504 (b)(1) for storm frequency design criteria.

(1) Watercourses to remain unobstructed

Except as authorized by a development plan approved by the Director of Public Works or his designee, no person shall place or cause to be placed any obstruction of any kind in any watercourse within the city and its ETJ. The owner of any property within the city, through which any watercourse may pass, shall keep the watercourse free from any obstruction not authorized by a development plan.

(2) Channel modifications

A. Modifications to existing watercourses or newly created open channels may be designed as earth, sodded or as concrete lined channels. Liners other than sod or concrete which enhance the aesthetics or habitat value of the watercourse and which reduce future maintenance requirements are encouraged. Preliminary planning for the applicability of other channel liners shall be reviewed with the Director of Public Works or his representative prior to the submittal of construction plans for approval.

B. Natural Unimproved Waterways. Runoff that results from upstream development and is discharged to an unimproved waterway can cause flood damage to properties adjacent to the waterway. Natural undeveloped waterways do not receive regular maintenance. Design of natural waterways shall take into consideration fluvial geomorphologic principals and practices. Consulting Engineers and Development Review officials shall work to resolve potential downstream impact issues.

(3) Maintenance

Design of new channels or alterations to existing channels shall consider future maintenance requirements. A maintenance schedule for any private channel shall be submitted to and approved by the Director of Public Works prior to approval of construction plans. Maintenance requirements of concrete channels consist of de-silting activities, prevention of vegetation establishment in construction joints, and repair of concrete as necessary. Maintenance of earthen channels includes regular observation and repair as necessary of erosion, scouring, and removal of silt deposits, as necessary to maintain design parameters. Developers shall be responsible for maintaining newly planted channels until coverage is established throughout 85 percent of the area. This area shall include slopes, floor, and any attendant maintenance easement. New earthen channels shall be planted with drought resistant, low growth, native species grasses, which will allow unobstructed passage of floodwaters. Johnsongrass, Giant Ragweed and other invasive species shall not be allowed to promulgate in channels. Suggested species shall include, but not be limited to, Common Bermuda, Coastal Bermuda, Buffalo Grass, Sideoats Grama, Seep Muhly, Little Bluestem, and Indiangrass. Mowing frequencies vary with the vegetation growth rates, but is required when the grass exceeds the design roughness coefficient of the channel.

(4) Multiple Uses

Planned multiple-use of a watercourse is allowed (e.g. bike paths or greenbelt). If multiple use of the watercourse is to be incorporated, the Applicant shall form a property owners association that shall assume maintenance responsibility for private amenities. The appropriate government agency will be responsible for maintenance of public amenities. The Applicant shall provide overlay easements for public or private use.

(5) Velocity Criteria

Table 504-8 shall be used to determine the type of Stormwater Management Facility that shall be used.

Table 504-8 Velocity Control

Velocity (fps)	Type of Facility Required	Hydraulic Radius (ft.)	Correction Factor	Maximum Permissible Velocity (fps)
1 to 6 (Maximum Average Velocity = 6 fps)	Vegetated Earthen Channel	0-1 1-3 3-5 5-8 8-10 Over 10	0.8 0.9 1.05 1.15 1.225 1.25	5 5.5 6.3 6.9 7.35 7.5
6 to 8	Concrete Retards	NA	NA	NA
> 8	Concrete Lining or Drop Structures	NA	NA	NA

A. Where velocities are in the supercritical range, allowance shall be made in the design for the proper handling of the water.

B. Ensure that the channel will contain the hydraulic jump (sequent depth) throughout the extent of the supercritical profile. An exception to this criteria is

where concrete lined lateral channels discharge down the side slopes of channels. These channels may be designed for normal depth plus freeboard provided velocity controls are established at the main channel flowline.

C. Ensure that the energy grade of the channel will not result in upstream flooding at existing or proposed lateral facility connections.

(6) Retard Spacing

Retard spacing shall be computed as follows when using the City standard retard section Figure 504-3 and the following equations:

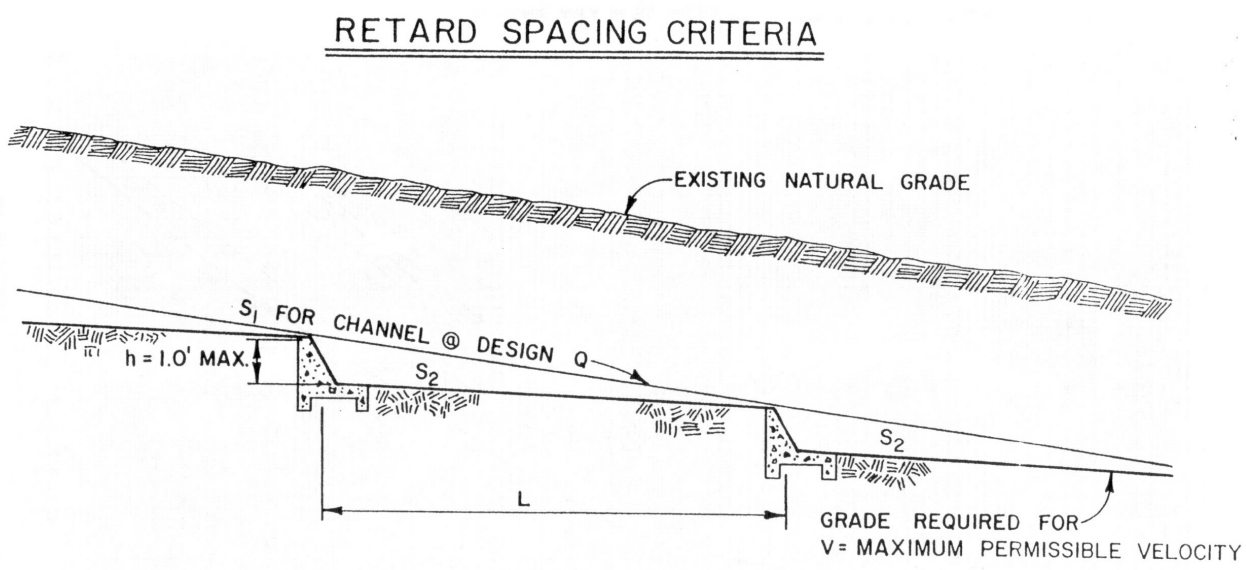


Figure 504-3

$$L = 1.0' \div (S1 - S2)$$

Where: L = Distance required between retards in feet.
S1 = Actual slope of channel in ft./ft.
S2 = Slope of proposed channel for maximum permissible velocity established from Table 504-8, i.e.:

And

$$S2 = [(NV) \div (1.486R^{2/3})]^2$$

Where: V = maximum permissible velocity established from Table 504-8
N = .035
R = area/wetted perimeter

(7) Concrete lined channels.

The design of concrete lined channels shall comply with the following general requirements:

A. Freeboard consistent with Table 504-9 will be applied to the 25-year design.

B. From the top of the concrete lining to the top of the ditch, a side slope not steeper than three (3) horizontal to one (1) vertical shall be required; nor shall the slope be less than twelve (12) to one (1).

C. For normal conditions, the concrete lining shall be a minimum of five (5) inches thick and reinforced with No. 3 round bars @ 12 inches on center each way. Where surcharge, nature of ground, height and steepness of slope, etc. become critical, design shall be in accordance with latest structural standards. All concrete lining shall develop a minimum compressive strength of not less than three thousand (3,000) pounds per square inch in twenty-eight (28) days. The depth of all toe downs shall be 36 inches upstream, 24 inches downstream, and 18 inches for side slopes. The City's Construction Inspector may permit an 18" toe down in rock subgrade in lieu of the above toe down requirements. The horizontal dimensions of toe downs shall not be less than six (6) inches.

D. Maximum concrete riprap side slopes shall be one and one-half horizontal to one vertical, unless soils tests made by a geotechnical engineer shows that a greater slope, or a special design, will be stable. Where vehicular traffic may travel within a horizontal distance equal to one-half the vertical rise of the slope, a two-foot surcharge load shall be included in the design.

E. Fencing will be required adjacent to the channel where channel vertical wall heights exceed 2 feet. Fencing will also be required adjacent to the channel where channel side slopes exceed 2:1 and the channel depth is greater than 2 feet. The fencing must not cause sight distance problems for motorists.

F. Vertical walls will not be permissible for depths greater than two (2) feet unless properly fenced or enclosed. Walls will have a minimum thickness of six (6) inches .

G. Easements or rights-of-way for concrete lined channels shall extend a minimum of two (2) feet on both sides of the extreme limits of the channel. "Extreme limits" of the channel shall mean the side slope intercept with the natural ground or proposed finished ground elevation.

H. A minimum N value of roughness coefficient of 0.015 shall be used for a wood float type surface finish. This N value is as used in Manning's formula.

Table 504-9
Drainage Freeboard for Concrete
Lined and Earth Channels for (25) year storm

Design Depth of Flow	Required Freeboard
0 to feet 5 feet	0.5 foot
5 to 10 feet	10% of design depth
10 feet and over	1.0 foot

(8) Vegetated Earth channels

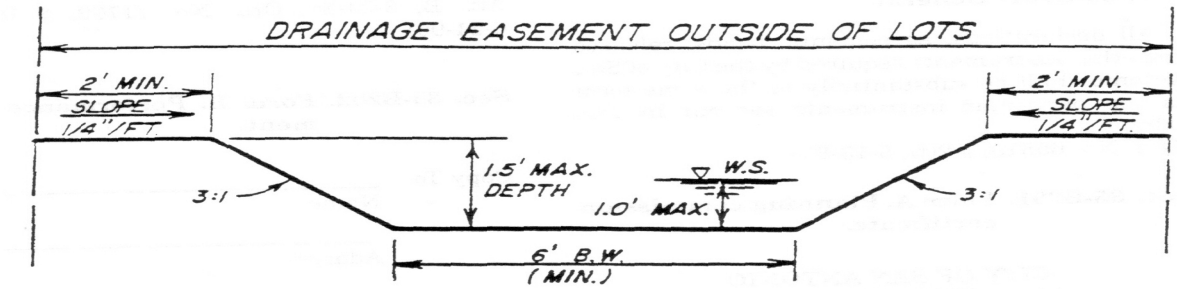
A. Freeboard consistent with Table 504-9 will be applied to the 25-year design.

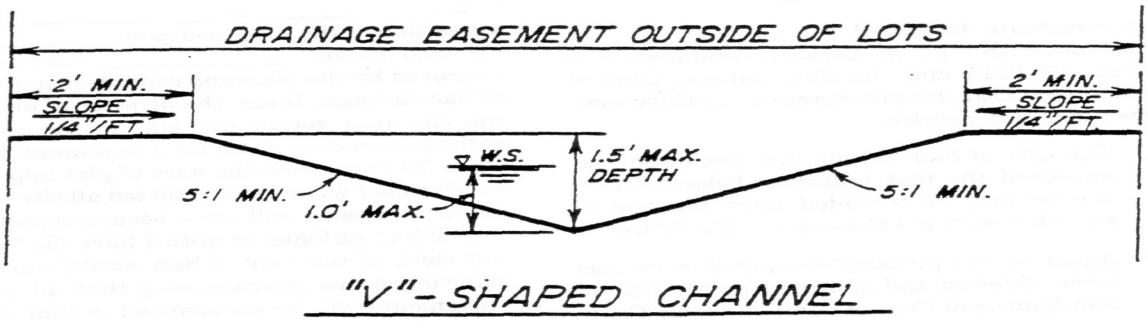
B. The side slope shall not be steeper than three (3) horizontal to one (1) vertical.

C. Easements or rights-of-way for improved earth channels shall conform to the requirements stated in subsection (d) of this Section and shall extend a minimum of two (2) feet on one side and fifteen (15) feet for an access road on the opposite side of the extreme limits of the channels when such channels do not parallel and adjoin an alley or roadway. When such channels do parallel and adjoin an alley or roadway, the easement or right-of-way shall extend a minimum of two (2) feet on both sides of the extreme limits of the channel. Where utilities are installed in the access road of the drainage right-of-way, the right-of-way shall extend two (2) feet on one (1) side and seventeen (17) feet on the opposite side of the design limits of the channel. These seventeen (17) feet are to provide an access way along the channel with a maximum cross slope of one (1) inch per foot toward the channel. Where designed channel bottoms exceed one hundred (100) feet in width, the fifteen-foot extra width shall be provided on both sides of the channel.

D. Interceptor drainage easements shall extend a minimum of two (2) feet on both sides of the extreme limits of the channel. Refer to Figure 504-4.

E. Improved earthen channels will be vegetated by seeding or sodding. Eighty five percent of the channel surface area must have established vegetation before the City of San Antonio will accept the channel for maintenance.





NO RETARDS
VEL. CONTROL
STANDARDS FOR
INTERCEPTOR DRAINS
FOR INTERCEPTING SHEET FLOW
(WITHOUT ACCESS EASEMENT REQ'D)

(Ord. No. 86711, § 22, 9-25-97)

Figure 504-3

(9) Channel bends and turns - Freeboard.

Allowance for extra freeboard shall be made when the center line radius of the channel is less than three (3) times the bottom width. Where sharp bends or high velocities are involved, the applicant shall use the following formula for computing the extra freeboard:

$$d_2 - d_1 = V^2(T + B) \div 2gR$$

Where: d_1 = depth of flow at the inside of the bend in feet.

d_2 = depth of flow at the outside of the bend in feet.
B = bottom width of the channel in feet.
V = the average approach velocity in the channel in feet per second.
T = width of flow at the water surface in feet.
g = 32.2 feet/second squared.
R = the center line radius of the turn or bend in feet.

A. The quantity d2-d1 divided by 2 shall be added to the normal depth of flow before adding the required freeboard in calculating required right-of-way widths.

B. Where sharp turns are used without curved sections, the depth required shall be large enough to provide for all head losses. Allowance shall be made for any backwater head that may result.

C. For normal design conditions no extra freeboard is required. An accepted rule of thumb to follow is this: Centerline radius of channel should be at least three (3) times the bottom width.

(i) Storm Sewers

(1) For all ordinary conditions, storm sewers shall be designed on the assumption that they will flow full under the design discharge; however, whenever the system is placed under a pressure head, or there are constrictions, turns, submerged or inadequate outfall, etc., the hydraulic and energy grade lines shall be computed and plotted in profile. In all cases adequate outfalls shall be provided and the system adequately designed.

(2) No storm sewers shall be less than twenty-four (24) inches in diameter.

(3) Minimum easement widths for storm sewers will be the greater of 15' or six-feet on both sides of the extreme limits of the storm sewer width (e.g. the easement width for a three barrel 10' wide box culvert with 6" walls would be (3*10')+(4*0.5')+(2*6') = 44').

(j) Inlets and Openings

(1) Drop curb openings – sidewalk does not abut opening.

Where drop curb openings are used to take storm water off the Streets and into drains, the length of the curb opening can be calculated from the weir formula using the coefficient of 3.087 in the following formula:

$$L = Q \div Ch^{3/2}$$

Where: L = the length of drop curb opening required in feet.
Q = amount of flow in CFS based on 25-year design frequency.
C = 3.087.

h = head of weir in feet.

Gutter line depressions will be permitted where such depressions will not hamper the flow of traffic. For amount of curb exposure, conform to City of San Antonio Inlet Standards.

(2) Curb or Drop inlets.

Where drop inlets are use, the city standard inlets with adequate reinforcing steel may be used. All other types or designs shall be subject to the approval of the Director of Public Works. The following formulas for inlet capacity are based on drop inlets in sag points. Inlet capacities on grades will be considered less, the amount of which depends on Street grades, deflections, cross slopes, depressions, etc.

(3) Grate inlets.

The flow of water through grate openings may be treated as the flow of water through a rectangular orifice. The following formula may be used for determining grate capacity:

$$Q = CA\ (2gh)^{1/2}$$

Where: Q = discharge in cubic feet per second.
C = orifice coefficient of discharge (taken as 0.70).
g = acceleration due to gravity (32.2 ft./sec.^{2})
h = head on the grate in feet.
A = net area of the openings in the grate in square feet.

This formula gives the theoretical capacity of the grate inlet. Since grate inlets are subject to considerable clogging, capacity of the grate inlet will be taken as one-half on the value given by this formula.

(4) Curb opening inlets.

The capacity of curb opening inlets will depend on whether or not the opening is running partially full or submerged. If the depth of flow at the curb opening inlet is such as to cause a partially full opening, a weir effect will develop and the following formula will apply:

$$Q = C_w L(h)^{3/2}$$

Where: Q = the discharge of capacity in cubic feet per second.
C_w = the weir coefficient of discharge (3.087).
L = the length of curb opening in feet.
h = the head or depth of water at the opening in feet.

If the depth of flow at the curb opening is such as to fully submerge the opening, the orifice effect will develop and the formula used shall be identical to that given under grate inlets with the exception that the head, h, on the curb opening orifice shall be taken as the depth from the

top of the water surface to the center of orifice or opening; one hundred (100) percent efficiency will be allowed for curb opening inlets.

35-505 Floodplains

Design Criteria outlined in Section 35-504 Storm Water Management are incorporated in this division.

(a) Title, duties of officials.

The provisions of this Section, Article 4, Division 6 (floodplain permit procedures), § 35-806 (floodplain administrator), and § 35-495 (violations of floodplain ordinance) of this Chapter, including the definitions in Appendix "A" of this Chapter which pertain to floodplains, shall be known as and may be cited as the city's Floodplain Ordinance, and all officials of the city having duties under these regulations are ordered and directed to perform such duties as required of them under these regulations.

(b) Findings of fact.

(1) The flood hazard areas of San Antonio are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect the public health, safety and general welfare.

(2) These flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, floodproofed, or otherwise protected from flood damage.

(c) Statement of purpose.

The purpose of this division is to promote land use controls necessary to qualify the city for flood insurance under requirements of the National Flood Insurance Act of 1968 with provisions designed:

(1) To protect human life and property exposed to the hazards of flooding;
(2) To avoid increasing flood levels or flood hazards or creating new flood hazards areas;
(3) To minimize public and private property losses due to flooding;
(4) To preserve the natural floodplains where at all possible;
(5) To ensure that potential property owners are notified if property is in a special flood hazard area;
(6) To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
(7) To minimize prolonged business interruptions;

(8) To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in special flood hazard areas;
(9) To minimize expenditure of future public money for costly flood control projects; and
(10) To help maintain a stable tax base by providing for the sound use and development of flood prone areas in such a manner as to minimize future flood blight areas.

(d) Methods of reducing flood losses.

In order to accomplish its purposes, this division uses the following methods:

(1) Restricts or prohibits uses that are dangerous to health, safety or property in times of flood, or cause increases in flood heights or velocities;
(2) Requires that uses vulnerable to floods, including public facilities which serve such uses, be protected against flood damage at the time of initial construction;
(3) Controls the alteration of natural floodplains, their protective barriers and stream channels;
(4) Prevents the construction of barriers which will divert flood waters and subject other lands to greater flood hazards;
(5) Controls development which would cause greater erosion or potential flood damage such as grading, dredging, excavation, and filling.
(6) Imposes a Regulatory 100-year Floodplain that requires using the ultimate development of the watershed to determine the 100-year water surface elevations. New developments must be constructed above this elevation.

(e) Lands to which provisions apply.

This division shall only apply to areas of special flood hazard within the jurisdiction of the city and where applicable in its area of extraterritorial jurisdiction.

(f) Basis for establishing the areas of special flood hazards.

The areas of special flood hazard identified by the Federal Emergency Management Agency in a scientific and engineering report entitled "The Flood Insurance Study, Bexar County, Texas and Incorporated Areas", updated periodically by the Federal Emergency Management Agency, together with the accompanying Flood Insurance Rate Maps and Flood Hazard Boundary-Floodway Maps and any revisions thereto, are hereby adopted by reference and declared to be a part of these regulations. The areas of special flood hazard identified by the Federal Emergency Management Agency on its Flood Insurance Rate Maps (FIRM), currently published for the City of San Antonio and surrounding counties shall be used as the controlling study for the base flood within the city limits of San Antonio and its ETJ unless a more current study is required by the Floodplain Administrator. Typically, new studies will be required for development where existing studies were performed prior to the City of San Antonio's adoption of the 1997 Drainage "Ordinance 86711" and / or where City records indicate the ultimate development of the watershed has not been considered. Similar studies done by FEMA shall also be used for control in the city of San Antonio's area of extraterritorial jurisdiction, along with the floodplain information reports prepared by the United States Corps of Engineers, and the United States Geological Survey, Water Resources Division District Office, Austin, Texas, 1:24,000 U.S.G.S. quadrangle maps as prepared for the Federal,

Emergency Management Agency or the latest revisions thereof. These reports and maps are available for inspection by the public in the office of the city drainage engineer. Information and studies sanctioned and adopted by the floodplain administrator or by city council subsequent to publication of the Flood Insurance Study and associated FIRM which update the base flood elevations, floodplain boundaries or flows shall also be used for control.

(g) Compliance.

(1) No structure or land in an area of special flood hazard shall hereafter be located, altered, have its use changed, or otherwise be developed unless a floodplain development permit has been issued, pursuant to the terms of this subdivision. Proposed work must be started within twelve (12) months of the date of approval of a floodplain development permit, otherwise the permit will become null and void. The floodplain development permit will be in effect for six (6) months following the start of construction unless otherwise approved on the permit by the Floodplain Administrator.

(2) No Building Permits, Floodplain Permits or Plat approvals will be issued on properties with past floodplain violations unless the permits will remedy the violation.

(3) Work permitted with a floodplain development permit shall be undertaken in a manner designed to minimize surface runoff, erosion and sedimentation, and to safeguard life, limb, property and the public welfare in accordance with the NPDES (TPDES) Construction Site Regulation Ordinance, Ordinance No. _____ as amended.

(h) Abrogation and greater restrictions.

This division is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this division and another conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

(i) Interpretation.

In the interpretation and application of this division, all provisions shall be:

(1) Considered as minimum requirements;
(2) Liberally construed in favor of the governing body; and
(3) Deemed neither to limit nor repeal any other powers granted under state statutes.

(j) Warning and disclaimer of liability.

The degree of flood protection required by this subdivision is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions greater floods can and will occur and flood heights may be increased by manmade or natural causes. These regulations do not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. These regulations shall not create liability on the part of the city of San Antonio or any officer or employee thereof for any flood damages that result from reliance on these regulations or any administrative decision lawfully made thereunder.

(k) Allowable and Prohibited Development within the Regulatory Floodplain

(1) Generally

A. No development will be permitted that has a significant adverse impact to other properties – refer to Section 35-504 (b)(1).
B. No increase in the Regulatory 100-year Floodplain elevation will be permitted within the watershed as a result of development.
C. An increase in water surface elevation is permitted solely on the developer's property if the Regulatory 100-year Floodplain is contained in a dedicated drainage easement or right-of-way.
D. Account for increase in discharge due to loss of storage and increase in impervious cover in all reclamation analysis.
E. Demonstrate that the development will not increase the Regulatory 100-year Floodplain velocities above 6 fps. No increase in velocity will be permitted if predevelopment velocities in the floodplain exceed 6 fps.

(2) Allowable Development

The following development may be allowed in the regulatory 100-year floodplain and will require a Floodplain Development Permit:

A. All weather (passes the ultimate development 100-year flood) street crossings.
B. Utility Construction
C. Parks.
D. Greenways.
E. Recreational Facilities and Golf Courses.
F. Hike and bike trails.
G. Drainage improvements that mitigate existing or anticipated flood hazards.
H. Capital Improvement Projects.
I. Maintenance activities necessary to maintain the storm water conveyance of the floodplain.
J. Drainage infrastructure repair.
K. Floodplain restoration.
L. Wetland reestablishment or mitigation.
M. Habitat reestablishment.
N. Installation of Flood Monitoring Controls – rain gages, early flood warning systems, high water detection systems, etc.
O. Installations of emergency devices necessary to warn, alarm and protect citizens at flood hazards.
P. Improvements to a structure that does not fall under the definition of Substantial Improvement.
Q. Elevating and / or floodproofing structures in the floodplain.
R. 100-year floodplain reclamation where the watershed drainage area is less than 320 acres.

S. Parking lot construction where water depths do not exceed 6".
T. 100-year floodplain reclamation in areas of ineffective flow.
U. 100-year floodplain reclamation in overbank areas subject to extensive shallow (0'-3') flooding where flood velocities in the overbank area are less than 3 fps.
V. Historic structure reconstruction, rehabilitation or restoration.
W. Development in the Low Risk Flood Area subject to the requirements of Section 35-505(q).
X. Reclamation between the 100-year floodplain and the regulatory 100-year floodplain. Elevate development one foot (1') above the water surface elevations established for the regulatory 100-year floodplain.
Y. Projects that are in the best interest of the public.
Z. Non-residential construction. Some or all of the following restrictions will be placed on non-residential construction in the floodplain:

1. Demonstrate that no alternate site is available for development within the property that is out of the floodplain.
2. Meet all the requirements of Sec. 35-505(n)(2) Nonresidential Construction.
3. Ensure the lowest finished floor elevation and/or the height to which the building must be floodproofed is no lower than the higher elevation of the energy grade line or the water surface elevation plus one foot (1') of the regulatory 100-year floodplain.
4. No increase in water surface elevations over ultimate conditions is permitted anywhere within the watershed as a result of the construction. An increase in water surface elevation is permitted on the developer's property if the floodplain is contained in a dedicated drainage easement or right-of-way.
5. Unflooded vehicular access must be available to the development from a public street.
6. Demonstrate that the development will not increase the 100-year floodplain predevelopment velocities above 6 fps. No increase in velocity will be permitted if predevelopment velocities exceed 6 fps.
7. Demonstrate that the development will not be subject to damage from hydrostatic or hydrodynamic forces, debris impact, soaking, sediments and contaminants.
8. Provide, operate and maintain an early flood warning system for the development. Warning Systems will be subject to periodic inspection by the City of San Antonio to ensure they are maintained and operated as intended.
9. Complete the Letter of Map Revision process for the development.
10. The owner shall indemnify the City of San Antonio against damages resulting from flooding on the owner's site.
11. Other site-specific restrictions and / or requirements deemed appropriate by the Floodplain Administrator.

(3) Areas of Flood Inundation

Construction in areas of Flood Inundation must meet the requirements of subsection (m) (General Standards). Structures associated with park and recreation development (fences, open construction type bleachers, concession stands etc.) may be permitted in areas of flood inundation. Keep this construction out of the flood conveyance section of the floodplain. Compensate for loss of storage. Secure structures to minimize damage from hydrostatic or hydrodynamic forces (including buoyancy) and debris impact.

(4) Prohibited Development within the Regulatory Floodplain

The following development will not be allowed in the regulatory floodplain.

A. Development without first obtaining a Floodplain Development Permit.
B. Habitable structures.
C. Street or access construction that does not provide all weather access.
D. Activity prohibited by Chapter 34, Article VI of the City Code "Aquifer Recharge Zone and Watershed Protection".
E. 100-year floodplain reclamation where the watershed drainage area exceeds 100-acres except as provided in Section A.

(l) Requirement.

No development or other encroachment is allowed in a floodplain that will result in any increase in the base flood elevations within the floodplain during discharge of water of a base flood unless the floodplain is contained within an easement. Where construction of structures in a floodplain is allowed by the Director of Public Works, a floodplain development permit shall be required to ensure conformance with the provisions of this division. In addition, all land development in any area of special flood hazard shall be required to have a floodplain development permit.

(m) General standards for flood hazard reduction

In all areas of special flood hazards the following provisions are required;

(1) All new construction or substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads including the effects of buoyancy (see U .S. Corps of Engineers Flood Proofing Regulations, Chapter 6, Section 610).
(2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage (see the United States Corps of Engineers Flood Proofing Regulations, Chapter 5 and Chapter 6).
(3) All new construction or substantial improvements shall be constructed with materials and utility equipment resistant to flood damage (see the United States Corps of Engineers Flood Proofing Regulations, Chapter 12 and Chapter 13).
(4) All new and replacement toilet, sinks, showers, water heaters, pressure tanks, furnaces, and other permanent plumbing installations shall be installed at or above the base flood elevation or floodproofed.
(5) All new and replacement water supply systems shall be designed to San Antonio Water System standards to minimize or eliminate infiltration of flood waters into the system and discharges from the systems into flood water.

(6) New and replacement sanitary sewage systems shall be designed to city sanitary sewer standards to minimize or eliminate infiltration of flood waters into the system and discharges from the systems into flood water.

(7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding. Waste disposal systems shall be located above the base flood water surface elevation.

(8) Filling or the disposal of any materials which will diminish the water flow capacity of any waterway or floodplain defined by this ordinance must be compensated for with remedial action by additional excavation or otherwise so as not to diminish water capacity.

(9) Floodplain engineering and procedures requirements within FEMA or United States Corps of Engineers official flood prone areas shall conform to the engineering criteria as set out in Exhibit D.

(n) Specific standards for flood hazard reduction

In all areas of special flood hazards where base flood elevation data has been provided in accordance with these regulations, the following provisions are required:

(1) Residential construction.

Construction of habitable structures within the regulatory floodplain (base flood) is not allowed unless the floodplain is revised with a floodplain permit. Residential construction must be elevated one foot (1') above the regulatory floodplain.

(2) Nonresidential construction.

A. New construction or substantial improvements of any commercial, industrial or other nonresidential structure shall have either (a) the lowest floor, including basement, elevated to one foot (1') above the level of base flood elevation, or (b) have the lowest floor, including basement, with attendant utility and sanitary facilities, be floodproofed so that below the base flood level plus one foot (1') and above the lowest floor, the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy.

B. New construction and substantial improvements, with fully enclosed areas below the lowest floor (including basement) that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. A minimum of two (2) openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, or other covering or devices provided that they permit the automatic entry and exit of floodwaters.

C. Electrical heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

D. A registered professional engineer or registered architect shall submit a certification to the director of public works that the standards of this subsection are satisfied. The certification shall include a statement to the effect that the engineer has developed and/or reviewed structural design, specifications, and plans for the construction and finds them to be in accordance with this subsection. The director of public works shall utilize the flood proofing regulations manual prepared by the United States Army Corps of Engineers as a guide in determining construction requirements.

(3) Manufactured homes.

A. All manufactured homes shall be anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to the following (refer to FEMA Manual #85, Manufactured Home Installation in Flood Hazard Areas):

1. Over the top ties at each of the four-(4) comers of the manufactured home with two (2) additional ties per side at intermediate locations. Manufactured homes more than fifty (50) feet long require one (1) additional tie per side.
2. Frame ties at each comer of the home with five (5) additional ties per side at intermediate points. Manufactured homes more than fifty (50) feet long require four (4) additional ties per side.
3. All components of the anchoring system shall be capable of carrying a force of four thousand eight hundred (4,800) pounds;
4. Any additions to the manufactured home shall be similarly anchored.

B. All manufactured homes to be placed or substantially improved within Zones Al-30, AH, and AE shall conform to the following criteria:

1. Stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the mobile home will be one (1) foot above the base flood level. A registered professional civil engineer, registered architect, or registered public surveyor shall submit a certification to the director of public works that the standard of this paragraph complies with subsection (a).
2. Adequate surface drainage and access for a hauler are provided.
3. In the instance of elevation of pilings: (i) lots are large enough to permit steps, (ii) piling foundations are placed in stable soil no more than ten (10) feet apart, and (iii) reinforcement is provided for pilings more than six (6) feet above the ground level.

(4) Floodways.

A. Located within the areas of special flood hazard are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

B. Encroachments are prohibited, including fill, new construction, substantial improvements and other developments, unless certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in flood levels during occurrence of the base flood discharge.

C. If subparagraph (1) above is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of this article.

D. The placement of any manufactured home is prohibited except in an existing manufactured home park or subdivision.

(o) Areas of shallow flooding (AO Zones).

Located within the areas of special flood hazard are areas designated as areas of shallow flooding. These areas have special flood hazards associated with base flood depths one (1) to three (3) feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and indeterminate. Therefore, in these areas the following provisions shall apply:

(1) All new construction and substantial improvements of residential structures shall have the lowest floor elevated one (1) foot above the highest adjacent grade or one (1) foot above the depth number specified on the community's FIRM (at least two (2) feet if no depth number is specified), whichever is higher controls.

(2) All new construction and substantial improvements of nonresidential structures shall:

(3) Have the lowest floor elevated above the highest adjacent grade as high as the depth number specified on the community's FIRM, (at least two (2) feet if no depth number is specified).

(4) Together with attendant utility and sanitary facilities, be completely floodproofed to or above that level so that any space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

(5) A registered professional civil engineer, registered public surveyor, or registered architect shall submit a certification to the director of public works that the standards of this section are satisfied.

(6) Require within Zones AH and AO, adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

(p) Subdivision proposals.

(1) All subdivision proposals shall be consistent with sections 35-505(b), 35-505(c), and 35-505(d).

(2) All proposals for the development of subdivisions shall meet the development permit requirements of this division. No floodproofing of an existing or proposed building in a new subdivision will be allowed as a substitute for providing the proper finished ground elevation, at the slab, above the ultimate development one-hundred year or twenty-five-year plus freeboard flood elevation, whichever is higher. Buildings in a proposed subdivision shall be on land that is above the controlling flood elevation.

(3) Flood elevation data shall be provided for subdivision proposals and other proposed development, if not otherwise provided, and shall conform to the design requirements of Section 35-504 Stormwater Management.

(4) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood hazards, and in accordance with this division.

(5) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed so that they will not affect the existing water surface elevations of the base flood, the ultimate development one-hundred year or twenty-five year ultimate development flood (whichever is greater) in the area of special flood hazard.

(6) All proposed subdivisions must be contiguous to high ground that is not subject to flooding (the base flood, ultimate development one-hundred year or the twenty-five-year ultimate development flood, whichever is higher) that is in excess of one (1) foot flow depth, i.e., no "island" will be considered for platting; unless adequate connecting structures capable of passing the base flood, ultimate development one-hundred year or twenty-five-year ultimate development flood (whichever is higher) are provided to high ground (not subject to the controlling flood of the same flood plain), and an additional one (1) foot of free board is provided to all minimum floor slab elevations.

(7) All proposed subdivisions traversed by an area of special flood hazard where the "buildable" portion of the subdivision is severed by the flood plain shall be provided with adequate access. Adequate access shall be a structure that will pass the control flood (ultimate development one hundred-year development) without overtopping the structure. Upstream property must not be affected by backwater, and velocities in the vicinity of the structure must be controlled to prevent scour, erosion or structural damage. Proposed subdivisions that involve the platting of streets shall have at least one (1) access to an unflooded portion of existing dedicated street or roadway.

(8) Proposed subdivisions that do not involve the platting of streets shall have access to an existing dedicated street that is not subject to flood depths of over one (1) foot.

(9) Existing channels shall not be increased or decreased from their natural state until engineering data meeting the requirements of Section 35-504 Stormwater Management has been approved by the city engineering division. Flood plain engineering and procedures requirements for subdivision within FEMA or United States Corps of Engineers official flood prone areas shall conform to the engineering criteria as set out in Section 35-504 Stormwater Management.

(q) Low risk flood area.

(1) New construction or substantial improvement of any structure, as permitted by other ordinances and regulations unless otherwise stated, may be permitted in a low risk flood area through a flood plain development permit. The low risk flood area, generally known as the River Bend Area, is specifically described in Figure 1. This section shall apply only to the lower level of multilevel structures and the street level adjacent to the river walk area. The lower level of a multilevel structure is in the low risk flood area if it is adjacent to the river walk and has access to the river walk area. The lower level is further defined as being below the regulatory flood level.

A. Permitted uses in the low risk flood area will be limited to nonresidential uses such as commercial restaurants with open air dining facilities, recreation and entertainment areas, and other commercial establishments.

B. Any permanent or temporary use as a place of residence or sleeping quarters shall not be permitted in the low risk flood area.

C. No construction shall be permitted below the River Walk level. All new construction along the River Walk shall be multistory, with street level egress from any newly constructed shop, restaurant, or other establishment on the River Walk. New construction at the River Walk level shall be essentially open with jalousies, folding doors, iron gates, or other similar provisions for security. All new construction in the low risk flood area shall utilize to a maximum extent decorating and building techniques that minimize flood damage. The first habitable floor shall be elevated one (1) foot above the base flood level.

(2) The flood plain development permit application shall be submitted to the director of public works and signed and sealed by a registered professional engineer. The application shall include two (2) sets of documents with the following information:

A. Plans and specifications showing the site and location, dimensions of all property lines and topographic elevations of the lot, existing and proposed structures and improvements, fill, storage of materials, location and elevations of existing and proposed streets and utilities, floodproofing measures, relationship of the above to the location of the flood boundary, the regulatory flood elevation and data, and the existing and proposed flood control measures and improvements.

B. Cross-sections and profile of the area and the regulatory flood level.

C. Flood study and drainage report in areas where a study and report have not been reviewed and accepted by the city.

D. Description of surrounding properties and existing structures and uses.

E. Justification and reasons for the construction or substantial improvements with consideration of the intent and provisions of these regulations and information as may be applicable on the general standards of section 35-505(m) and the following:

1. The danger that materials may be swept onto other lands or downstream to the injury of others.
2. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owners.
3. The importance of the services provided by the proposed facility to the community.
4. The availability of alternative locations not subject to flooding for the proposed use.
5. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
6. The relationship of the proposed use to the flood plain management program for the area.
7. The safety of access to the property in times of flood for emergency vehicles.
8. The expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters expected at the site.
9. That the construction or substantial improvement will not result in adverse increase of flood heights, additional threat to public safety,

extraordinary public expense, or conflict with other laws or regulations.

F. An agreement whereby a notice will be inserted in the deed and other conveyance documents of the property and filed with the Bexar county clerk's office that the property is located in a flood prone area. The notice shall also contain a statement of the number of feet the lowest nonfloodproofed floor of the proposed structure is below the one-hundred-year flood level and that actuarial flood insurance rates increase as the first floor elevation decreases.

G. Such other factors which are relevant to the purposes of these regulations.

(3) The director of public works shall approve or deny a flood plain development permit in the low risk flood area based on the provisions of this section and other requirements of these regulations which may be applicable to the low risk flood area.

(4) If a flood plain development permit is disapproved, the director of public works shall notify the applicant in writing of the section(s) and the specific requirement(s) of these regulations with which the proposed development does not comply and the nature of such noncompliance.

(5) Requests for variances shall follow the variance procedures as set forth in section 35-464 of this Chapter.

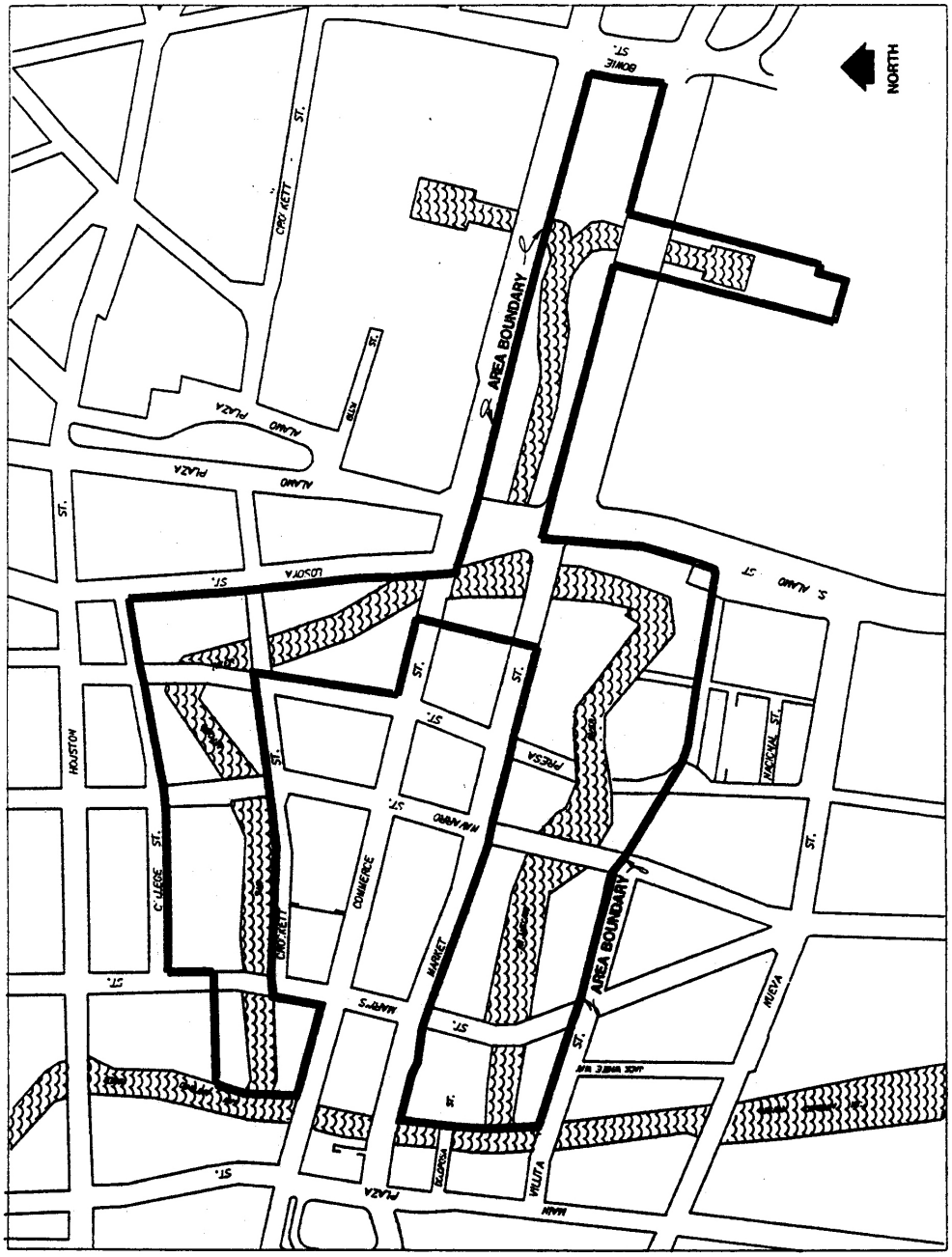


Figure 1: Low risk flood area

35-506 Transportation and Street Design

The purpose of this Section is to prescribe minimum design standards for Streets within new subdivisions, developments requiring site plan approval, and for developments requiring a zoning permit. Unlike the situation in traditional subdivision regulations, one intent of this Section is to permit narrower Street widths while requiring greater connectivity in order to more efficiently disperse traffic, protect pedestrians from high vehicular speeds, and to enhance the Streetscape. For Conventional Subdivisions, Commercial Centers, and Applications for Development Approval within conventional zoning district, the existing Street widths and design standards are retained in order to accommodate the heavier traffic levels and greater reliance on vehicular travel.

This Section implements the following provisions of the Master Plan:

- *Urban Design, Policy 1b: Create and adopt urban design guidelines and standards which specifically encourage pedestrian safety and comfort, transit access, Street level amenities, and circulation between neighborhood centers.*
- *Urban Design, Policy 1b: Provide design standards for Streetscape improvements including appropriate landscaping, furnishings, signage/graphics and pedestrian paths, along with gateways, landmarks, and markers at strategic access/transition points.*
- *Urban Design, Policy 1c: Encourage Street patterns that promote pedestrian connections and multiple connection points and do not contribute to collector Street congestion.*
- *Urban Design, Policy 1g: Prepare design and construction policies and standards for utility and transportation infrastructure, capital improvement projects, public facilities and development projects that reinforce neighborhood centers and provide diverse, pedestrian-friendly neighborhoods.*
- *Urban Design, Policy 4c: Create Streetscapes which emphasize both pedestrians and vehicles.*
- *Urban Design, Policy 4c: Encourage the design and use of rear alleys in residential neighborhoods to reduce "points of conflict" between automobile and pedestrian traffic.*
- *Urban Design, Policy 4c: Increase minimum standards for pedestrian infrastructure including sidewalk width, location and lighting. Establish an administrative variance procedure to provide relief from sidewalk requirements where appropriate.*
- *Urban Design, Policy 4c: During the construction of all major thoroughfares and the reconstruction of existing major thoroughfares, install medians unless not feasible.*
- *Urban Design, Policy 4c: Minimize the use of continuous turn lanes when feasible.*
- *Urban Design, Policy 5a: Provide roadway improvements that facilitate delivery of emergency, police and fire services.*
- *Urban Design, Policy 5b: Evaluate and revise traffic engineering standards, as appropriate, to provide for traffic circles, local and collector offset Street intersections, parallel and head in parking and bike lanes.*
- *Urban Design, Policy 5f: Consider the use of alternative surface materials to increase durability.*
- *Urban Design, Policy 5f: Work with the County to establish design requirements for Streets and road construction so that Streets have a lifetime expectancy of at least 20 years.*

- *Urban Design, Policy 5i: Develop a safe and convenient pedestrian travel network with sidewalks, walkways and trails integrated into the transportation system and neighborhood centers.*
- *Urban Design, Policy 5i: Ensure that all new sidewalks comply with City codes, and are designed to be functional and unobstructed, linking neighborhoods, residential areas and neighborhood centers together.*
- *Urban Design, Policy 5i: Provide incentives for developers to exceed minimum standards for the pedestrian infrastructure.*
- *Urban Design, Policy 5i: Promote safety on the pedestrian networks by eliminating physical barriers for the movement impaired maximizing visual contact between the network and surrounding areas modifying zoning to promote high activity uses adjacent to the network providing buffers from vehicular traffic, and enhancing signage for pedestrians*
- *Urban Design, Policy 5j: urban design as an integral part of all new construction and improvement of transit centers, Streets, and pathways in the City.*
- *Urban Design, Policy 5k: Accommodate the specific needs of disabled individuals in all transportation modes.*
- *Urban Design, Policy 5h: Consider bicycling in the design and construction of public Streets.*

The City further finds and determines that Street layout and design can have a very significant influence on the total imperviousness and hydrology of a site. Alternative road layout can result in a significant reductions in imperviousness, thereby reducing stormwater runoff, protecting water quality, and providing cost savings for developers and homebuyers.

(a) Applicability

(1) Generally

The provisions of this Division shall apply to:

A. Any application for subdivision plat approval.
B. Any application for Master Development Plan approval if no subdivision plat is required.
C. Any ministerial permit where required by subsection (b), below.

(2) Building permit requirements.

The construction of standard curbs and sidewalks shall be a condition of the granting of a building permit in each of the following cases:

A. A new building or structure when curbing is in place or curb lines are established for a sidewalk.
B. The repair or improvement of an existing building or structure when curbing is in place or curb lines established and the cost of the repair or improvement amounts to twenty-five (25) percent or more of the assessed evaluation of the building/structure as set forth by the city tax roll for the entire lot.
C. A new or an additional driveway approach.
D. Refer to section (q) for sidewalk standards.

In addition to the above requirement, premises used as motor vehicle service stations or parking lots require the construction of a minimum six (6) inch raised curb or other approved traffic barrier, within the lot, along the entire Street frontage except at approved driveway approaches and access walks to prevent vehicular access to the street except at designated driveway(s).

(b) Improvements Required

All street grading and base construction shall be in accordance with approved plans. Streets shall be completed consistent with the approved construction plans.

(c) Classification

(1) Conventional Classification System

Classification of an existing or proposed Street not already identified on the Major Thoroughfare Plan, for the purpose of determining the appropriate design of a roadway or development, or for the purpose of determining the appropriateness of a location for a proposed use, shall be done by the Director of Public Works. Pursuant to the Major Thoroughfare Plan, the following classification system is hereby adopted:

Table 506-1: Functional Classification System Description

Functional Class	Level of Mobility	System Access	Level of Accessibility
Freeway	Connects all urban subregions together, connects urban and rural service areas with metro major activity centers; connection to outside cities.	To other freeways, principal arterial, and selected arterial; no direct land access.	Long trips at high speed within and through the metro area; express transit trips.
Primary Arterial	Connects two or more subregions; provides secondary connections outside cities; complements freeway in high volume corridors.	To freeways, other principal arterial, and high volume collectors; no direct land access except major traffic generators.	Medium distance to long trips at high to moderate speeds within the urban area; express transit trips.
Secondary Arterial	Connects adjacent subregions and activity centers within subregions.	To freeways, principal arterial, other arterial, and collectors; restricted direct land access.	Medium to short trips at moderate to low speeds; local transit trips.
Collector	Connects neighborhoods within and between subregions.	To arterial, other collectors, and local Streets; direct land access.	Primarily serves collection and distribution function for the arterial system at low speeds; local transit trips.
Local (includes Conservation Access, Local Type A, Local Type B,)	Connects blocks within neighborhoods and specific activities within homogeneous land use areas.	To collectors and other local Streets; direct land access.	Almost exclusively collection and distribution; short trips at low speeds.

(2) Traditional Design Classification

The following classification system shall be used for designing a Traditional Neighborhood Development (TND) pursuant to § 35-203 of this Chapter:

Table 506-2: Functional Classification System Description

Functional Class	Level of Mobility	System Access	Level of Accessibility
Parkways	Parkways bring people into a neighborhood, or pass traffic through natural areas. Parkways are not designed for development. When the parkway enters the new neighborhood, it becomes a boulevard.	To parkways, boulevards, and to freeways, principal arterial, and selected arterial; no direct land access.	Long trips at moderately high speeds within and through the metro area; express transit trips.
Boulevard	Provides multi-lane access to commercial and mixed-use buildings, and carries regional traffic.	To freeways, other principal arterial, and high volume collectors; no direct land access except major traffic generators.	Medium distance to long trips at high to moderate speeds within the urban area; express transit trips.
Main Street	Provides access to, and a space for, neighborhood commercial and mixed-use buildings.	To local Streets, lanes, and other avenues or main Streets.	Medium to short trips at moderate to low speeds; local transit trips.
Avenue	Connects centers and neighborhoods. Avenues go from neighborhoods to centers, and are not long (no more than one mile). Avenues may circulate around a square or neighborhood park.	To local Streets, lanes, and other avenues or main Streets.	Primarily serves collection and distribution function for the transportation system at low speeds; local transit trips.
Local	Provides access to housing	To local Streets, alleys, and avenues or main Streets	Almost exclusively collection and distribution; short trips at low speeds.
Lanes	Provides access to single-family homes.	To local Streets, alleys, and avenues or main Streets	Almost exclusively collection and distribution; short trips at low speeds.
Alleys	Provides access to rear of property.	To local lanes and local Streets	No direct frontage. Access is from the rear of lots.
Trails	Provides non-motorized access throughout a neighborhood.	Connects homes, parks and schools, and shopping districts	No vehicular access.

Source: adapted from Local Government Commission, Street Design Guidelines for Healthy Neighborhoods (Jan. 1999)

(3) Classification Factors

In determining the classification of a Street, factors to be considered include the following existing or proposed features:

A. Facility Geometrics, including the number and width of traffic lanes, turning lanes, and
B. parking lanes.
C. Access Conditions, including any restrictions on access, the spacing of private accesses,

D. and average lot frontages.
E. Traffic Characteristics, including ADT, percentage of trucks, average operating speed, percentage of turning movements, origin-destination characteristics of the traffic, and peak hour characteristics of traffic.
F. Adjacent Land Uses.

(d) Cross-Section and Construction Standards

(1) Interior Streets

The subdivider shall dedicate all interior Streets within the subdivision based upon the following tables:

Table 506-3
Conventional Street Design Standards

Street Type	***Marginal Access***	***Alley***	***Access to Conservation Subdivision***	***Local Type A***	***Local Type B***	***Collector***	***Secondary Arterial [1]***	***Primary Arterial [2]***
ROW (min.) [8]	36’	24’	36’ 34’	50’	60’	70’	86’	120’
Pavement Width [8]	26’	18-24’	24’ [7]	28’	40’	44’	48	72-48’
Grade (max.) [3]	12%	12%	12%	12%	12%	7%	5%	5%
Grade (min.) [4]	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
“K” Crest Curve	30	NR	30	30	30	55	70	70
“K” Sag Curve	35	NR	35	35	35	55	60	60
Centerline Radius (min.)	100’	50'	100’	100'	100'	400'	700'	1,200'
Stopping Sight Distance	75’	75’	75’	110’	150’	200’	300’	300’
Curb	No	No	No	Yes	Yes	Yes	Yes	Yes
Median	NR	NR	NR	NR	NR	NR	14’ min.	14’ min.
Sidewalk Width (see subsection (q)(5))	NR	No	4’/6’ One Side Only	4’	4’/6’	4’/6’	4’/6’	4’/6’
Bike Facilities [6]	NR	NR	NR	Nr	NR	City Option [5]	Yes Path [5]	Yes Path [5]
Trees	NR	No	NR	NR	NR	Yes	Yes	Yes
Planting Strips	NR	NR	NR	2’ Min.	2’ Min.	2’ Min.	2’ Min	2’ Min.

Notes and Rules of Interpretation:

Table 506-3 is required for conventional option subdivisions (see § 35-202) or subdivisions not subject to Table 506-4, below), except for « Access to Conservation Subdivision », which apply only to Conservation Subdivisions (§ 35-203).

[1] For Secondary Arterial Type B right-of-ways designated on the Major Thoroughfare Plan, the required right-of-way will be a minimum of 70’ with 86’ at the intersections as determined by the Director of Public Works.
[2] For Primary Arterial Type B right-of-ways designated on the Major Thoroughfare Plan, the required right-of-way will be a minimum of 70’ with 120’ at the intersections as determined by the Director of Public Works.
[3] See Figure 1 on section 35-506 (d) (3) Cross-Section and Construction Standards
[4] 0.4% Optional with curb and gutter.
[5] Bike path and sidewalks can be combined. See section 35-506(7).
[6] When designated on bicycle master plan as approved by City Council
[7] Entry portion without parking
[8] Right-of-Way and pavement widths in established neighborhoods can be waived by the Director of Public Works as required on Capital Improvement Projects.

Table 506-4
Traditional Street Design Standards

Street Type	***Trail***	***Alley***	***Lane***	***Local***	***Avenue***	***Main Street***	***Boulevard***	***Parkway***
ROW (min.)	14'	20'	38'	48'	82'	58'	124'	86'
Pavement Width [1]	8'-14'	10'-12'	16'-18'	22'- 27'	27'-48'	28'-36'	44'-70'	44'+
Grade (max.)	10%	10%	10%	10%	7%	7%	7%	5%
Grade (min.) [4]	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
"K" Crest Curve	NR	NR	30	30	55	55	55	70
"K" Sag Curve	NR	NR	35	35	55	55	55	60
Curb Radius	N/A	15'	15'	15'	25'	15'	25'	25'
Centerline Radius [2]	95'	50'	90'	90'	250'	600'	500'	1,000'
Stopping Sight Distance	75'	75'	110	110'	150'	N/A	300'	300'
Intersection Sight Distance	15'	15'	15'	25'	75'	N/A	150'	150'
Curb	No	No	Yes	Yes	Yes	Yes	Yes	No
Median	N/A	N/A	N/A	N/A	14' in.	N/A	14' min.	14' min.
Sidewalk Width (see subsection (q)(5))	N/A	No	4'/6'	4'/6'	4'/6'	4'/6'	4'/6'	4'/6'
Bike Facilities [3]	N/A	N/A	No	No	Yes Path	City Option	Yes Path	Yes Path
Trees	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Planting Strips	N/A	N/A	6'	6'	6'	City Option	6-11'	7-20'

Notes and Rules of Interpretation:

Table 506-4 applies only to the following development options: Commercial Center (§ 35-204), Commercial Retrofit (§ 35-206), Traditional Neighborhood Development (§ 35-207), and Transit-Oriented Development (§ 35-208), except as provided in footnote 5, below.

[1] See Table 506-4A below. The smaller street width with on-street parking prohibited, or the larger street width coupled with on-street parking on one or both sides of the street, may be provided if the adjoining buildings are provided with (1) an NFPA 13D fire sprinkler system in the case of Single-Family Dwelling Units, One Family Attached Dwelling Units, Two-Family (Duplex) Dwelling Units, Two-Family Attached Dwelling Units; (2) an NFPA 13R fire sprinkler system for Multi Family buildings; or (3) an NFPA 13 fire sprinkler system for Commercial Building.

[2] Lesser radius can be approved by the Director of Public Works.

[3] Bike path and sidewalks can be combined. See section 35-506(7).

[4] Optional 0.4% with curb and gutter.

[5] Any provision in Table 506-3 (entitled "conventional street design standards") notwithstanding, interior streets in a subdivision that would otherwise be required to comply with the provisions of Table 506-3 may instead comply with the provisions of Table 506-4 (entitled "traditional street design standards"), regarding pavement width requirements only, provided that the connectivity ratio (see subsection (e), below and § 35-207(g) of this Chapter) shall comply with the requirements for a Traditional Neighborhood Development. The proposed development shall comply with footnote 1 hereto. Pursuant hereto, street types in such subdivisions shall comply with Table 506-4 as follows: An Alley shall be required to meet the street width standards for an Alley as provided in Table 506-4; a Conservation Access street shall be required to meet the street width standards for a Lane; a Local Type A street shall be required to meet the street width standards for a Street; a Local Type B street shall be required to meet the street width standards for an Avenue; a Collector street shall be required to meet the street width standards for a Main Street; a Secondary Arterial shall be required to meet the street width standards for a Boulevard; and Primary Arterial shall be required to meet the street width standards for a Parkway.

Table 506-4A
Street Width options for Traditional Street Design Standards

Street Type	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
	Street Width	*Parking*	*Directional*	*Fire Sprinklers*	*Alleys*	*Max. Block*	*Connections*	*Turning Radius*
Lane	18'	None	1-Way	No	No	300'	27'	25-50'
Local	24'	1 Side	2-Way	No	Yes	Table 515-1	NR	25-50'
Local	27'	Both Sides	2-Way	No	No	Table 515-1	NR	25-50'
Lane	16'	None	1-Way	Yes	Yes	Table 515-1	NR	25-50'
Lane	18'	None	2-Way	Yes	Yes	Table 515-1	NR	25-50'
Lane	18'	1-Side	1-Way	Yes	Yes	Table 515-1	NR	25-50'
Local	22'	None	2-Way	Yes	Yes	Table 515-1	NR	25-50'
Local	22'	1-Side	2-Way	Yes	Yes	Table 515-1	NR	25-50'
Local	25'	Both Sides	2-Way	Yes	Yes	Table 515-1	NR	25-50'
Local	26'	Both Sides	2-Way	Yes	Yes	Table 515-1	NR	25-50'

Rules of interpretation for Table 506-4A:

Column A (Street Width) refers to the width of the street from curb face to curb face.
Column B (Parking) indicates whether on-street parking is permitted, whether on both sides or only one side of the street.
Column C (Directional) refers to the directional flow of traffic.
Column D (Fire Sprinklers) refers to whether fire sprinklers are required. See footnote 1 of Table 506-4, above.
Column E (Alleys) indicates whether alleys are required. Alleys are permitted for any street classification.
Column F (Max. Block) refers to the maximum block length. Maximum block length is not subject to an administrative exception (see § 35-501(b) of this Chapter).
Column G (Connections) indicates the width of streets connecting to the street from intersection to intersection. The connecting street must be located at each end of the block. "NR" means that a connecting street of minimum width is not required.
Column H (Turning Radius) refers to the minimum inside and outside turning radii (see "Turning Radius Diagram," below).

This diagram below provides the minimum turning radius for a pumper truck. The minimum inside radius is 25' and the minimum outside radius is 50'.

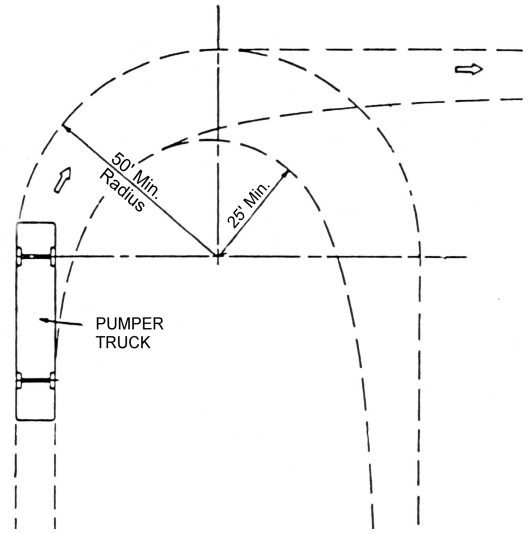
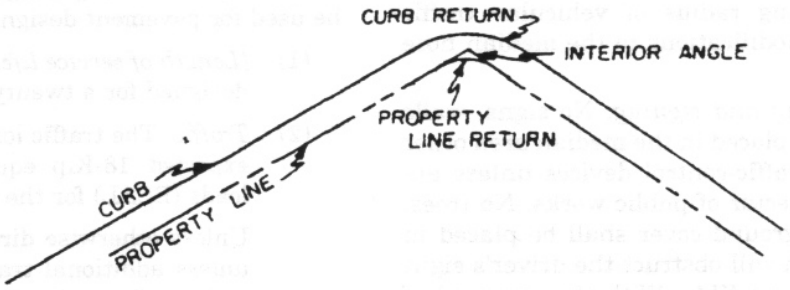


Figure 505-1 Turning Radius Diagram

Table 506-4B
Curb Return and Property Line Table

Minimum radii for Curb (Corner) Returns (CR) and Property Line Returns (PLR)

Interior Angles in Degrees	***Local "A" w/ Local "A"***		***Local "A" w/ Local "B"***		***Local "B" w/ Collector***		***Collector w/ Collector***		***Collector w/ Arterial***		***Arterial w/ Arterial***	
	CR	PLR	CR	PLR	CR	PLR	CR	PLR	CR	PLR	CR	PLR
120-105	15'	5'	20'	10'	25'	15'	25'	15'	25'	15'	30'	15'
105-90	15'	5'	20'	10'	25'	15'	25'	15'	25'	15'	35'	20'
90	15	5'	20'	10'	25'	15'	25'	15'	25'	15'	50'	35'
90-75	20'	10'	25'	15'	30'	20'	30'	20'	30'	20'	55'	40'
75-60	25'	15'	30'	20'	35'	25'	35'	25'	35'	25'	60'	45'



Notes:

(1) Intersections with interior angles greater than 120 degrees or less than 60 degrees not permitted.
(2) Property Line Return may be simple curve tangent to right-of-way lines or cut-off measured from PI of intersecting right-of-way lines.
(3) Street intersections with arterial streets may require additional turn lanes and/or turning islands, resulting in CR and PLR values that would be customized for the intersection design.
(4) Major Thoroughfare Plan streets shall intersect at continuous centerline extensions and not offset from each other.

(2) Vertical curvature

A gradual transition from one roadway grade to another shall be accomplished by means of a vertical parallel curve connecting two (2) intersecting tangents. No vertical curve for gradients having an algebraic difference of 1.5 or less will be required. The minimum length of vertical curve shall be computed from the following formula and table:

$$L = KA$$

Where: L = the length of vertical curve in feet
K = a constant related to sight distance and geometry of a parabolic curve (see Tables 506-3 and 506-4)
A = the algebraic difference in grades in percent

(3) Grade

A. Street and alley grades shall conform to the terrain and shall not exceed the values prescribed in Tables 506-3 and 506-4, above. No Street or alley grade shall be less than five-tenths of one percent (0.005) or four-tenth of one percent (0.004) if curb and gutter is provided, unless otherwise specified by the Director of Public Works. The minimum cross-slope of a road shall be 2% and the maximum shall be 4%.

B. Grades between 12% and 15% can be negotiated by the fire equipment depending upon the length of such grades, and the approach conditions below these grades. The restrictions on using grades between 12% and 15% are contained in Figure 506-2.

C. The Design Engineer should also note that the maximum grades may also be restricted by drainage considerations. Streets used as drains have maximum flow velocities assigned to control erosion of the pavement (see table 35-504-16).

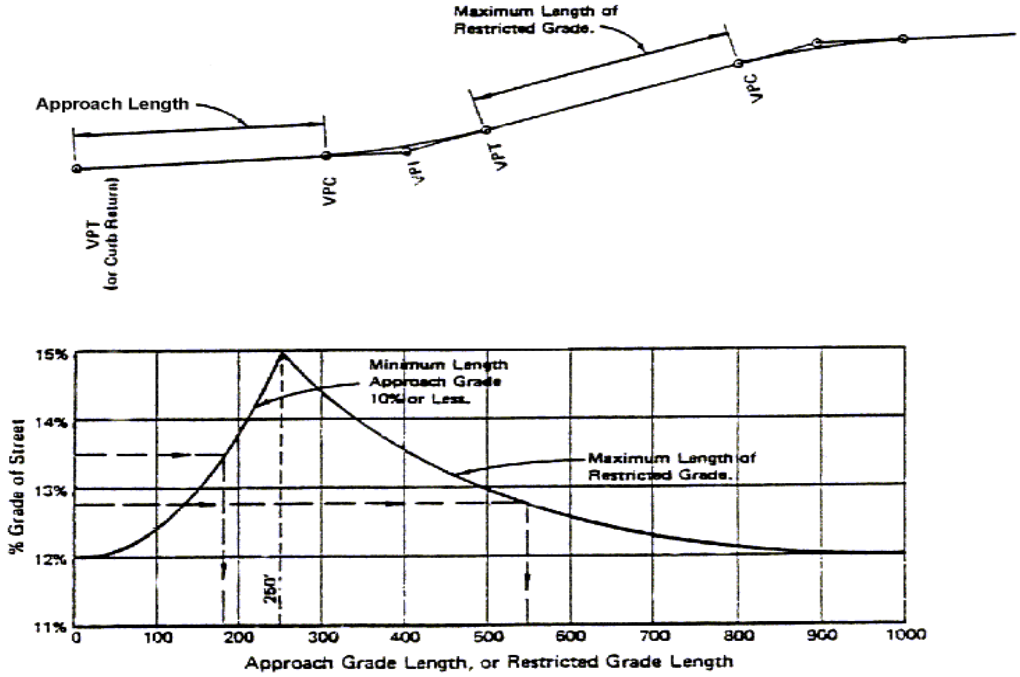


Figure 506-2

(4) Bicycle Facilities

When identified on the City Council approved Bike Facilities Master Plan the following will apply. Required Collector/Main Streets will include bike lanes or bike paths. Bicycle facilities along Arterial / Avenue / Boulevard / Parkway Streets shall be located separate from the pavement section. The bicycle facility, at least 5 feet in width and constructed of an all weather surface on one side of the street, shall be provided between the curb and the right-of-way line or the sidewalks can be constructed at least 8-foot in width on one side of the street to accommodate both pedestrian and bicycle traffic. If separate bicycle facilities cannot be provided, such as along existing collector and arterial streets of sufficient width, bicycle lanes, located within the pavement section, shall be a minimum of 5 feet wide (excluding curb and drain inlets), and shall be signed, striped and marked for bicycle use. Bike paths, when required within the city limits, may be constructed with development of the abutting property at the time building permit acquired.

(5) Intersection Sight Distance

To ensure safety of motorists and other travelers, it is necessary that drivers who are entering an intersection have an adequate view of approaching motorists. This view is required over a clear vision area, which is a right triangle where one side is called “intersection sight distance”

and the adjacent side is the distance between the driver and the path of the vehicles approaching from the side. The clear vision area is that portion of a property over which motorists must see to safely judge and execute a driving maneuver into the intersection and onto the street. This applies to intersections of two or more streets as well as junctions of driveways and streets. Clear vision areas must be free of visual obstructions, e.g. structures, walls, fences, and vegetation, which are higher than three feet and lower than eight feet above the pavement. The 1990 AASHTO Green Book, or latest revision thereof determines this length of the required intersection sight distance.

(6) Cul-de-sac Streets

The following criteria shall be used for cul-de-sac street design and fire hydrant layout:

A. For Cul-de-sac Streets 100 feet to 500 feet in total length, the following is required:

1. Turnaround right-of-way shall be not less than one hundred (100) feet in diameter in residential areas and not less than one hundred fifty (150) feet in diameter in commercial and industrial areas.

2. Turnaround shall include at least twenty-five (25) feet of paved driving surface with a minimum exterior radius of forty (40) feet for residential areas and sixty (60) feet for commercial and industrial areas.

3. The interior of the turnaround may be landscaped or paved. A maximum radius of fifteen (15) feet will be allowed for landscaping purposes.

B. For Cul-de-sac Streets in residential subdivisions greater than 500 feet and less than or equal to 1000 feet in total length, the following is required:

1. Pavement width for the entire length of the Cul-de-sac Street shall be a minimum of 30 feet, regardless of the type of residential subdivision.

2. Turnaround right-of-way shall be not less than one hundred twenty (120) feet in diameter.

3. Turnaround roadway shall have a minimum exterior radius of fifty (50) feet. The entire interior of the turnaround must be paved with no island.

C. In the C, RE, and R-20, zoning districts Cul-de-sac Streets over one thousand (1000) feet in length may be permitted subject to approval by the Director of Public Works after consultation with the Fire Chief or his designee. No such approval shall be granted unless the Director of Public Works finds the following:

1. The Cul-de-sac length, layout and topography will not impede safe access and egress by emergency vehicles including fire trucks and emergency medical services

2. A longer Cul-de-sac Street is needed because of unique topographical conditions such as steep slopes, wetlands, streams, or similar conditions and an alternative design would not more effectively accommodate said conditions.

D. Fire Hydrant installation. Fire hydrants located in Cul-de-sacs within residential subdivisions shall be located within 500 feet of every building site. In every case a fire hydrant shall be installed on the Cul-de-sac, not more than twenty (20) feet and not less than ten (10) feet from the intersecting street. For Cu-de-sac distances greater than 500 feet but less than or equal to 700 feet, a minimum of two fire hydrants shall be installed. One fire hydrant shall be installed on the Cul-de-sac, not more than twenty (20) feet and not less than ten (10) feet from the intersecting street, and the other at the mouth of the Cul-de-sac not more than ten (10) feet before the beginning of the turnaround. For Cul-de-sac distances greater than 700 feet but less than or equal to 1000 feet, a minimum of three fire hydrants shall be installed. One fire hydrant shall be installed on the Cul-de-sac, not more than twenty (20) feet and not less than ten (10) feet from the intersecting street. A second fire hydrant shall be placed at the mouth of the Cul-de-sac not more than ten (10) feet before the beginning of the turnaround. The third fire hydrant shall be installed as close as possible at the midpoint between the other two. Refer to the figure 506-3 below regarding fire hydrant locations on Cul-de-sacs.

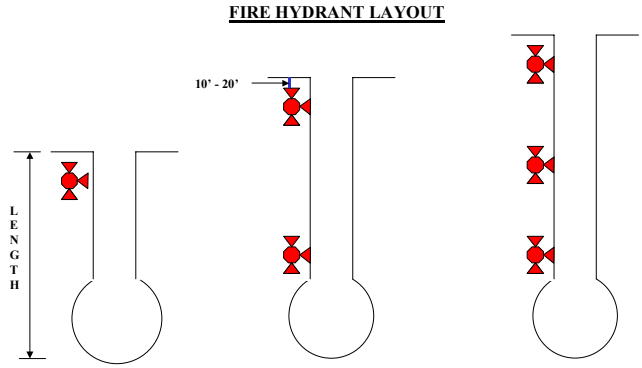


Figure 506-3

less than or equal to 500-ft.	greater than 500-ft. but less or equal to 700-ft	greater than 700-ft but less than or equal to 1000-ft

(7) Alleys

Alleys are optional unless it is required by table 506-4A

(8) Intersection with Alleys and Utility Easements

Where two (2) alleys or utility easements intersect or turn at a right angle, a cutoff of not less than ten (10) feet from the normal intersection of the property or easement line shall be provided along each property or easement line. If the alleys are not straight within each block or if they do not connect on a straight course with the alleys of adjoining blocks, then an easement shall be provided for the placing of guy wires on lot division lines in order to support poles set on curving or deviating rights-of-way or alleys.

(9) Substandard existing Streets

Where subdivisions are adjacent to existing Streets and right-of-way widths of those existing Streets are less than the minimum right-of-way widths as set out in this chapter for all Streets, no building permits shall be granted until the right-of-way widths have been dedicated to the minimum widths required by this Chapter abutting the development. The provisions of this subsection shall not apply within the Infill Development Zone ("IDZ"). Curb, sidewalk and pavement improvements adjacent to the development for multi-family and commercial developments shall be provided on sub-standard width existing streets at the time of building permit. .

(10) Curbs and Pavement

Curbs shall be required on both sides of all interior Streets. Curbs and pavement are required on the development side of all adjacent Streets except:

A. When the Director of Public Works determines that the curbs will interfere with or disrupt drainage.

B. When the Director of Public Works determines that public construction which would require curbs replacement will take place on the Street within three (3) years.

C. On local type A Streets in single- or two-family residential subdivisions within the RP and RE zoning districts.

D. On Streets in residential subdivisions where no adjacent lots are platted if approved by the Director of Public Works, such as Streets adjacent to walls or drainage ways.

E. Where the Director of Public Works determines that preservation of trees warrants the elimination, reduction in width, or modification to the curb requirements in accordance with the Tree Preservation Standards.

(e) Connectivity

The City Council hereby finds and determines that discontinuous Street systems provide are inefficient and has the effect of channeling traffic onto relatively few points of the transportation network. A well-connected street spreads traffic efficiently, provides greater opportunities for access by service and emergency vehicles, and furthers pedestrian mobility by increasing the number of destinations. (See Master Plan, Urban Design, Policy 1c). Accordingly, this section provides for both external and internal connectivity. External connectivity is promoted by requiring developers to connect to the existing Street network. Internal connectivity is promoted by requiring a connectivity index for internal Streets. The City Council acknowledges that there is a market for cul-de-sacs and Streets with few connections. The connectivity index preserves the opportunity to provide cul-de-sacs while, at the same, maintaining the integrity of the network as a whole. See R. Ewing, Best Development Practices: Doing the Right Thing and Making Money at the Same Time (Jan. 1997).

(1) Connectivity Index for Internal Streets

The Streets within any proposed subdivision shall provide a Connectivity Ratio of not less than 1.20. The Connectivity Ratio shall be computed by dividing the number of Street Links by the number of Nodes within the Subdivision. For purposes of this Subsection, the intersection a local Street within the proposed subdivision with an arterial or collector Street providing access to a proposed subdivision shall not be considered a node in computing the connectivity ratio. The connectivity index will not apply to subdivisions with less than 125 single family lots.

(2) Projecting Streets

Where adjoining areas are not subdivided, the arrangement of Streets in the subdivision shall make provision for the projection of Streets into such unsubdivided areas. Parcels shall be arranged to allow the opening of future Streets and logical further subdivision. Where necessary to the neighborhood pattern, existing Streets in adjoining areas shall be continued and shall be at least as wide as such existing

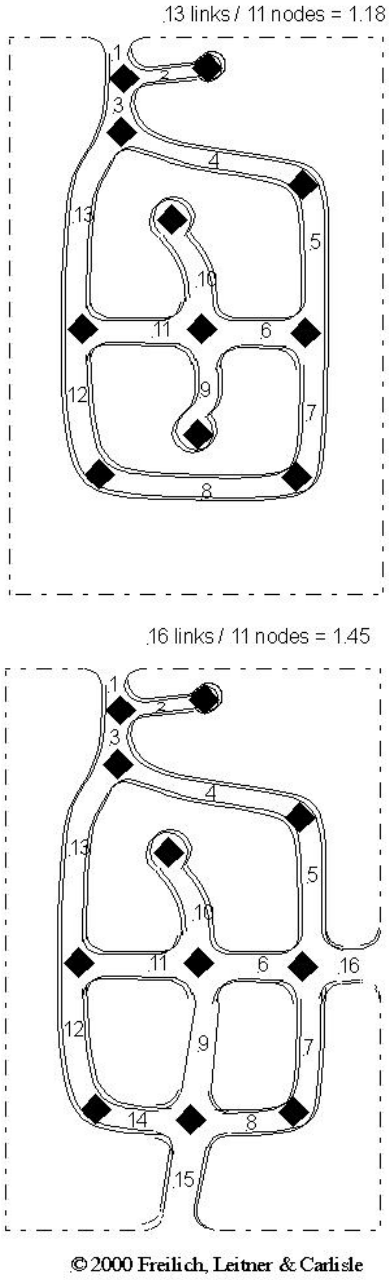


Figure 506-3

Streets and in alignment therewith. Where Streets change design in alignment and width, the Applicant shall provide transition sufficient to ensure safe and efficient traffic flow. This section is not intended to require Local designated streets to project into floodplains, bluffs or other natural features or existing development that has not made accommodations for connection.

(3) Reserve Strips Prohibited

There shall be no reserve strips controlling access to land dedicated or intended to be dedicated to public use. The Applicant shall ensure that there are no reserve strips controlling access to land dedicated or intended to be dedicated to public use.

(4) Half-Streets.

In the case of collector, local, or marginal access Streets, no new half-Street right-of-ways shall be platted. Where the proposed subdivision abuts upon an existing half-Street, the other half of the Street shall be platted.

(5) Dead-end Streets.

Dead-end Streets shall be prohibited except as short stubs to permit future expansion. A "short stub" is defined as being the average depth of the adjacent lot within the subdivision.

(6) Nonaccess easement.

When deemed necessary, and when the connectivity index required above would not be reduced, a vehicular nonaccess easement may be required on a lot(s) for the purpose of controlling ingress and egress to vehicular traffic.

(7) Secondary Access.

At least one access point into a single-family residential subdivision shall be provided for every 2,640 feet (1/2 mile) of frontage. Where a single family residential subdivision exceeds one-hundred twenty five (125) units, a secondary access will be required.

(f) Street intersections.

Streets shall intersect at an angle of not less than seventy-five (75) or more than one-hundred ten (110) degrees. The centerline offset of intersections shall be at least one hundred seventy -five (175) feet.

(g) Dedication of Arterial

(1) Adjacent streets.

The subdivider shall dedicate right-of-way width and provide pavement width in accordance with the following table and typical sections in subsection (d) of this Section.

Street Type	Right-of Way Width	Pavement Width
Primary arterial	60 ft.	24 ft. with curbs
Secondary arterial	43 ft.	24 ft. with curbs

(2) All existing streets.

Where subdivisions are adjacent to existing arterial streets and right-of-way widths of those existing arterial streets are less than the minimum right-of-way widths as set out in this chapter for all streets, the subdivider shall be required to dedicate on the plat one-half (1/2) of the right-of-way width required adjacent to the land being platted to bring the existing arterial streets to the right-of-way widths in accordance with the Major Thoroughfare Plan.

(3) Additional right-of way.

Additional right-of-way beyond that specified by the major thoroughfare plan may be required for major thoroughfares and/or their intersections in order to meet Texas Department of Transportation (TX DOT) requirements. The total right-of-way will generally not exceed one hundred twenty (120) feet. Where TXDOT has plans to acquire right-of-way within 5 years, a right-of-way reservation or a building setback line shall be established to preclude the construction of significant improvements that would ultimately be removed in conjunction with future highway widening.

(h) Street Names & Signage.

(1) Generally

Names of new Streets shall not duplicate, or cause confusion with the names of existing Streets, unless the new Street is a continuation of, or in alignment with, an existing Street. All new Street names shall be submitted to and approved by the United States Postal Service.

(2) Within City Limits

Within the incorporated areas of the City, Street name signs shall be installed at all intersections within and abutting the subdivision. Such signs shall be manufactured and installed by the subdivider in accordance to specifications of, and subject to plan reviews and inspections, by the city department of public works. Street name signs shall not be accepted by the city until the Street has been accepted for maintenance by the city, unless approved by the Director of Public Works in order to provide mail service.

(3) ETJ

Within the city's extraterritorial jurisdiction, Street name signs shall be installed at all intersections within and abutting the subdivision. Such signs shall be manufactured and installed by the subdivider in accordance to specifications of, and subject to plan reviews and inspections by the city department of public works.

(4) Warning and Regulatory Traffic Signs.

Within the city limits, regulatory and warning traffic signs shall be installed within and abutting the subdivision in accordance with the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*, as required by the City's Department of Public Works. Such signs shall be manufactured and installed by the subdivider in accordance to specifications of, and subject to plan reviews and inspections by, City's Department of Public Works. Warning and regulatory signs shall not be accepted by the City until the Street has been accepted for maintenance by the City.

(i) Street lights.

(1) Streetlights shall be provided in all subdivisions within the city. Street lights shall be installed by city public service at all public Street intersections with other public Streets, crosswalks, at safety lane intersections with public Streets, midblock areas, or service areas as determined by city policies.

(2) In subdivisions within the RP or RE zoning districts, or in the ETJ and proposing densities which do not exceed one (1) dwelling unit per acre, the Director of Public Works may waive the requirement for street lights for public street intersections or midblock areas where he finds that the area does not require such lighting for safe pedestrian or vehicular traffic.

(3) The subdivider shall contract with the city through the department of public works for payment of all costs associated with the engineering and installation of Street lighting. Such contracts must be executed prior to issuance of a letter of certification by the department of public works. Full payment for all costs must be made prior to the recordation of the plat.A copy of the current schedule of costs to the city of labor and materials associated with the engineering and installation of street lighting shall be filed by the Director of Public Works with the city clerk and be available for public inspection. New schedules shall be filed whenever there is an increase in costs.

(j) Private Streets.

(1) Applicability

Private Streets are permitted within Planned Unit Developments, the Business Park (BP) zoning district, and manufactured home/recreational vehicle parks.

(2) Design Standards

The design standards and construction specifications of private Streets shall be the same as for public Streets except as noted below.

A. A right-of-way of fifty (50) feet for a local type A streets and sixty (60) feet for local type B streets shall not be required.
B. The paved street width, exclusive of curb exposures, shall be a minimum of twenty-seven (27) feet for local type A streets and thirty (30) feet for local type B streets.

(3) Certification

Upon completion of construction, the Director of Public Works shall be provided with written a certification signed by a licensed professional engineer certifying that the private Streets and sidewalks (as applicable) were designed and installed as required by the provisions of this Chapter.

(4) Maintenance

Private Streets and sidewalks shall be owned and maintained by a corporation, community association, or other legal entity established for this purpose.

(5) Converting Private Streets into Public Streets

Homeowners Association (HOA) requesting the City to accept private street(s) into the City's street network shall follow this process.

The HOA at their expense must provide an Engineering Report to Public Works Department for review. The Engineering Report shall include.

A. Request from HOA that the City can accept the private street(s).
B. Document indicating 100% owner's participation.
C. Subdivision Plat
D. Subdivision Construction Plans to include plan and profile
E. Certification Letter from the Project Engineer certifying the construction of the subdivision was done in accordance with the Public Works Specifications.
F. Photos showing the conditions of the existing roadway and right-of-way through out the subdivision.
G. Pavement Condition Index (PCI)
H. Site Plan showing location of streetlights and traffic control devices (if applicable).

The Engineering Report must be completed before Public Works Department proceeds with the following procedures:

A. Public Works Department receives Engineering Report and distributes it to appropiate City Departments.
B. If the City Attorney's Office determines 100% of the legal property owners are represented as supporters of the request, this information is forwarded to the Street Maintenance Division Manager. If support for the ownership transfer is less than 100%, this information is submitted to the Public Works Department who will notify the applicant of the denial of the request.
C. The Street Maintenance Division Manager will evaluate the PCI Street Surface Condition and Appurtenances Information. If the print out scores indicate low score, then the Street Maintenance Division Manager will submit the information to the Public Works Department who will notify the applicant of the denial of the request.
D. If the City Engineer determines that the street does meet the minimum requirements, then the recommendation is submitted to the Public Works Director. The Public Works Director will determine whether it is in the interest

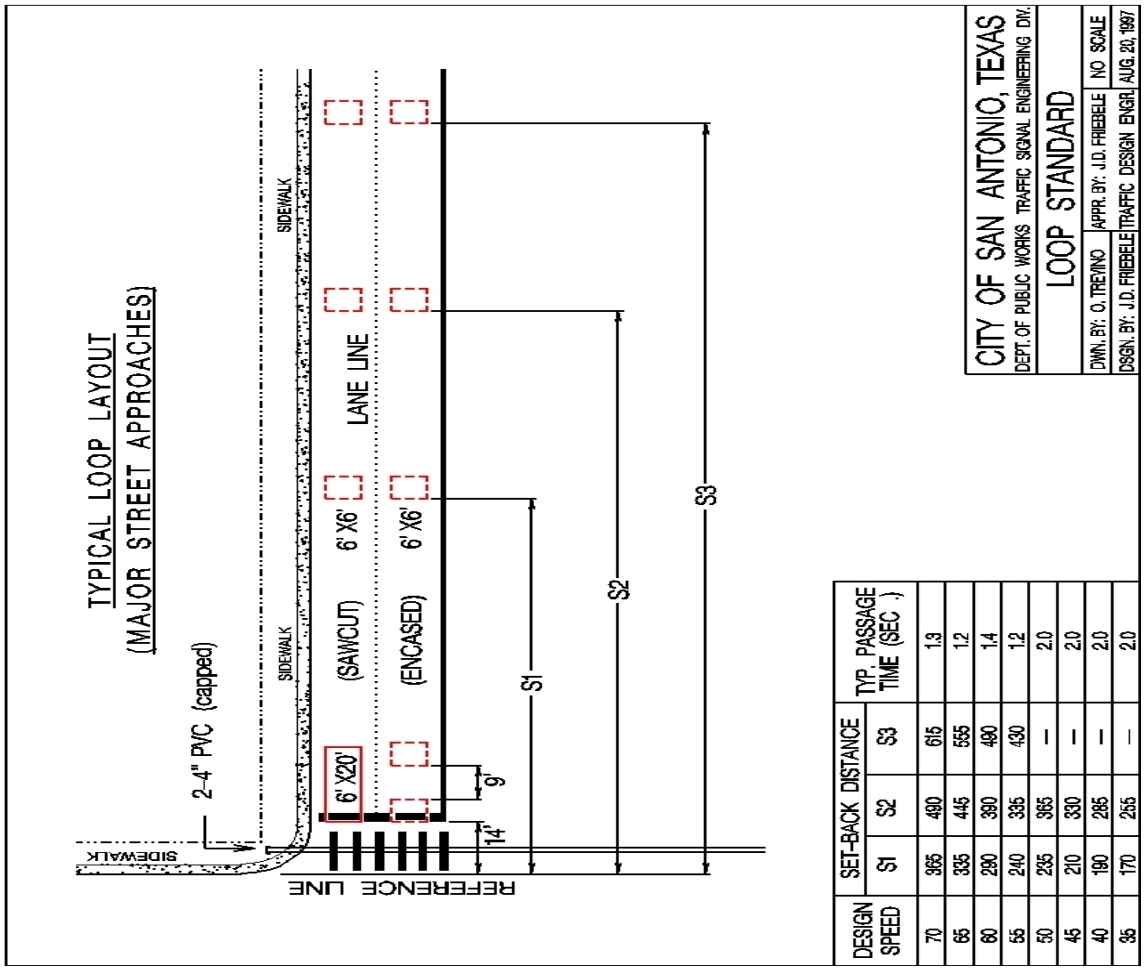
of the City to accept the street for ownership and maintenance and subsequently notifies the applicant of the decision.

E. Process for removal of Control Access Facilities

(k) Traffic signals.

(1) Where a proposed Street, or driveway, intersects a public Street at an existing traffic signal, the traffic signal shall be upgraded to accommodate the added traffic approach at the expense of the developer or subdivider. The design and construction of this partial signal installation shall comply with the Texas Manual on Uniform Traffic Control Devices (TMUTCD) and City of San Antonio specifications and design requirements.

(2) Where a proposed intersection involves an existing or proposed arterial Street, and the intersection could reasonably be expected to warrant a traffic signal within approximately five (5) years, the subdivider shall install that portion of the traffic signal infrastructure that is underground on the proposed Street. The design and construction of this partial signal installation shall comply with the TMUTCD and the City of San Antonio specifications and design requirements.



DESIGN SPEED	SET-BACK DISTANCE S1	S2	S3	TYP. PASSAGE TIME (SEC.)
70	365	490	615	1.3
65	335	445	555	1.2
60	290	390	490	1.4
55	240	335	430	1.2
50	235	365	—	2.0
45	210	330	—	2.0
40	190	285	—	2.0
35	170	255	—	2.0

Figure 506-4

(l) Horizontal curvature.

(1) Conventional Design

Horizontal centerline curvature shall be provided by simple circular curves with a constant radius for the safety and comfort of motorists. The minimum and maximum radii designated in this section, Tables 506-1 and 506-2, shall be used in designating horizontal curves. "Broken-back", compound curves, reverse curves shall not be permitted. A minimum fifty (50) feet tangent length is required between curves on local A and B streets. A minimum of one-hundred (100) feet tangent length is required between curves on collector and arterial streets. Superelevation may be used on arterials Streets with the approval of the Director of Public Works.

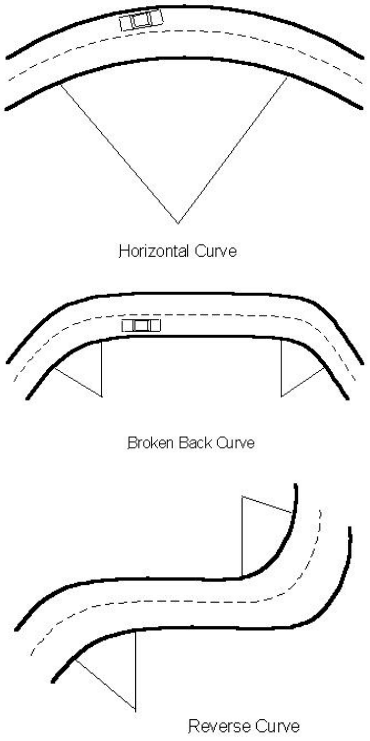


Figure 506-4

(2) Combination of curves.

A combination of horizontal and vertical curves shall be permitted provided sufficient sight distance is available for safe operation in accordance with the requirement of Subsection (d) of this Section.

(3) "Elbow" Configurations

An alternative design required by Subsection (d) of this Section may be used in lieu of the centerline radius prescribed by subsection (d) of this Section. The point of radius may be relocated along the lines indicated by letters on the figure below (lines AX, AY and AZ). The point of radius shall not exceed fifteen (15) feet from point A. The point of radius shall be shown on the plat. The point of radius may be shifted along the Street centerline (lines AX and AZ).

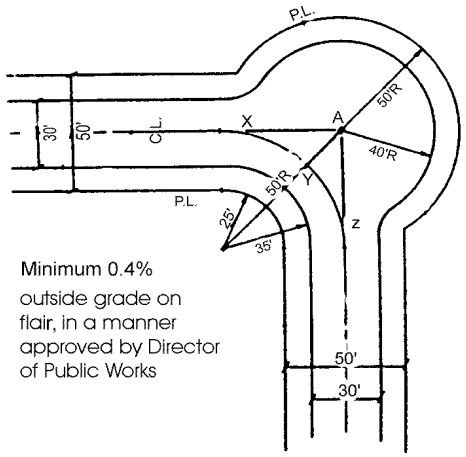


Figure 506-5

(m) Pavement and median transition.

Where cross section changes occur, appropriate pavement transition shall be provided. Transition shall be described as a ratio of lateral transition width to transition length in feet. The following formulas shall be used in computing appropriate transition:

(1) Local Street to Local Street, Local Street to Collector, Collector to Collector.

$$L = 20W$$

Where:

L = Transition length in feet measured along the center line of the Street.
W = Transition width measured as the difference in pavement width from the center line to the pavement edge of the two (2) cross sections.

(2) Arterial Streets except freeways.

$$L = DW$$

Where:
L = Transition length in feet measured along the center line of the Street.
D = Design speed of the particular Street section as determined by Subsection (d) of this Section.
W = Transition width measured as the difference in pavement width from the center line to the pavement edge of the two (2) cross sections.

(3) Median or Center Dividers

Median or center dividers will also be transitioned. Median transition shall generally parallel the pavement transition to a point where the median width is four (4) feet at which point the median shall be rounded off with a two-foot radius. Median or divider transition shall be designed so that abrupt offsets are not created at intersections.

(n) Medians

(1) Openings.

Medians shall be continuous. Openings in the median may be provided for public Streets or driveways provided the centerline spacing between median openings is at least four hundred (400) feet. When medians are open, left turn bays and median radii shall be provided and curbed. Existing medians shall be modified to conform to these requirements where necessitated by the traffic generated by the Proposed Development, as set forth in the Traffic Impact Analysis (see 35-502(l)(1) of this Chapter). Where existing streets are improved, dual left turn lanes can be approved if supported by a TIA (see 35-502).

(2) Special purpose medians.

Dividers constructed for aesthetic purposes as entrances for subdivisions or landscaping shall be permitted. The minimum width for such dividers is fourteen (14) feet with minimum eighteen (18) feet of pavement width on either side of the median. The divider shall maintain the full width for a minimum twenty-five (25) feet after which an appropriate transition shall be provided in accordance with standards for pavement and median transition (Subsection (m), above). The twenty-five (25) feet shall be measured from the edge of pavement of the ultimate width of the intersecting roadway. The nose or rounded portion of the divider shall be placed two (2) feet off the edge of the traveled roadway of the intersecting Street unless the turning radius of vehicular traffic indicates other modifications to the median nose are required. No signs, walls or fences, trees, shrubs or other ground cover shall be placed in the median which will obstruct the driver's sight distance (See Figure 506-7). The median design and exceptions to pavement width adjacent to median must be approved by the Director of Public Works.

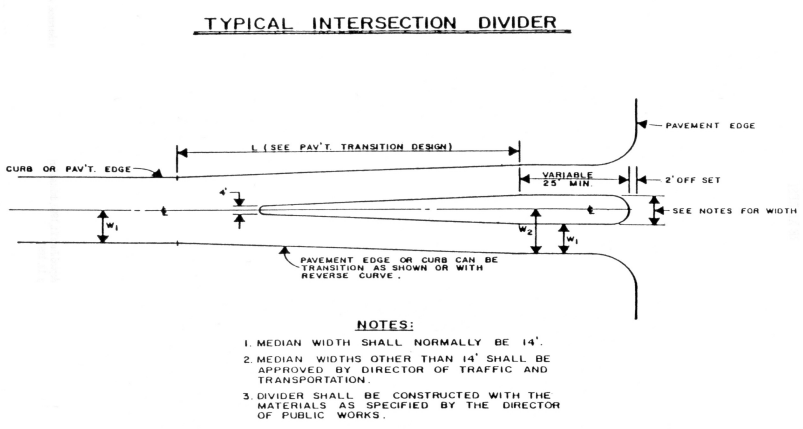


Figure 506-6

Landscaping shall be in accordance with current Landscaping Standards (§ 35-511) design standards of the director of parks and recreation. In addition appropriate maintenance agreements shall be made with the director of parks and recreation.

(3) Sidewalk Crossings

Where a median or traffic divider projects across sidewalks, the median (concrete or sod) shall be opened for five (5) feet at the projection of the crosswalk. This five (5) foot opening shall be paved to the grade of the existing surface to permit wheelchair and mobility impaired persons to utilize the crosswalk.

(o) Wheelchair ramps

(1) Location

Wheelchair ramps shall be constructed at the entrance to all crosswalks where sidewalks exist or where required as part of these regulations. A waiver of sidewalk requirements does not waive the wheelchair requirement. Where sidewalks or curbs exist, wheelchair ramps shall be added at locations specified herein, wherever any work is proposed to the existing driveways, curb, or sidewalks. Also, wheelchair ramps shall be added wherever missing sidewalks or curb segments are added in front of any lot or block of a subdivision.

(2) Design Standards

Any construction, reconstruction or other improvements addressed in this chapter shall conform as a minimum to the Americans with Disabilities Act and any rules and regulations relating thereto (see § 35-501(d). The Plat or Site Plan shall show infrastructure construction, reconstruction, repair or regrading and details of curb cut and wheelchair ramps. The location of the curb-cut opening and ramp must be coordinated with respect to the pedestrian crosswalk lines. This planning must ensure that the ramp openings at a fully depressed curb shall be situated within the parallel boundaries of the crosswalk markings. Ramps for the disabilitydisabled are not limited to intersections and marked crosswalks, and ramps shall also be provided at other appropriate or designated points where there is a concentration of pedestrian traffic, such as loading islands, midblock pedestrian crossings, and locations where pedestrians could not otherwise recognize the proper place to cross the street. Because non-intersection pedestrian crossings are generally unexpected by the motorist, warning signs shall be installed and parking shall be prohibited. Ramps for the disabilitydisabled shall have a textured nonskid surface for the user which also warns a sight-impaired person of the presence of the ramp. Wheelchair ramps shall be designed and constructed in accordance with the details in Figure 506-8, below.

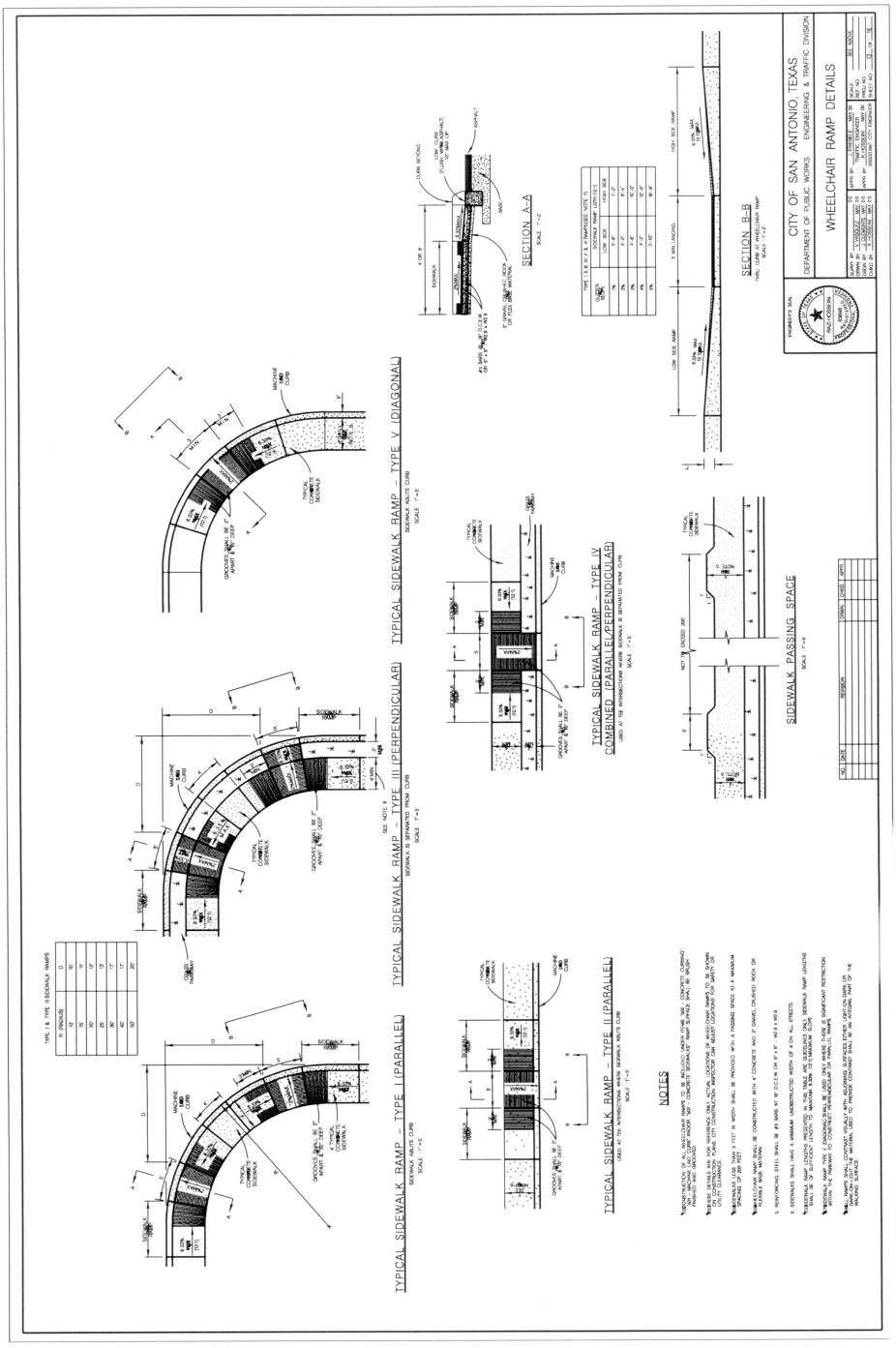

CITY OF SAN ANTONIO, TEXAS
DEPARTMENT OF PUBLIC WORKS ENGINEERING & TRAFFIC DIVISION
WHEELCHAIR RAMP DETAILS
TYPICAL SIDEWALK RAMP – TYPE I (PARALLEL)
TYPICAL SIDEWALK RAMP – TYPE II (PARALLEL)
TYPICAL SIDEWALK RAMP – TYPE III (PERPENDICULAR)
TYPICAL SIDEWALK RAMP – TYPE IV COMBINED (PARALLEL/PERPENDICULAR)
TYPICAL SIDEWALK RAMP – TYPE V (DIAGONAL)
SECTION A-A
SECTION B-B
SIDEWALK PASSING SPACE
NOTES

Figure 506-7

(p) Pavement Standards.

(1) Pavement structure

The design of pavement structures shall be in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures, 1993 or latest approved edition. The pavement design report shall be prepared and signed by, or under the supervision of, a professional engineer registered in the State of Texas. The following design requirements shall be used for pavement design:

(2) Length of service life

Pavement shall be designed for a twenty-year service life.

(3) Traffic Load, Reliability and Pavement Structures

The traffic load is the cumulative expected 18-Kip equivalent single axle loads (ESAL) for the service life. The following 18-Kip ESAL Reliability Level and Pavement Structure shall be used in the design of streets for each street classification:

Table 506-6
Pavement Specifications

Street Classification	18-KIP ESAL	Reliability Level	Minimum Pavement Structure	Maximum Pavement Structure
Primary and Secondary Arterials	3,000,000	R-95	SN = 3.80	SN = 5.76
Collector and Local Type B Streets	2,000,000	R-90	SN = 2.92	SN = 5.08
Local Type A Street with bus traffic	1,000,000	R-70	SN = 2.58	SN = 4.20
Local Type A Street without bus traffic	100,000	R-70	SN = 2.02	SN = 3.18

Traffic loads for primary and secondary arterials, collector and local type B Streets shall include bus traffic.

(4) Serviceability

The serviceability of a pavement is defined as the pavement's ride quality and its ability to serve the type of traffic (automobiles and trucks) which uses the facility. The initial serviceability index (p0) for flexible pavements shall be 4.2 and for rigid pavement shall be 4.5. The minimum terminal serviceability index (Pt) for local Streets shall be 2.0 and for collectors and arterials shall be 2.5. A standard deviation (S0) for flexible pavement shall be 0.45 and for rigid pavement shall be 0.35.

(5) Roadbed soil

A soil investigation must be performed for the design of pavement structures. The number of borings and locations shall be sufficient to accurately determine the stratum along the route. Any existing soil information that is available either from the city or from private sources will be evaluated and, if determined to be applicable and valid, will be allowed in place of new soil tests.

Roadbed soil having a plasticity index (P.I.) greater than twenty (20) shall be treated with lime to reduce the P.I. below twenty (20). Application rate of lime shall be determined based on laboratory testing. In no case shall the lime be less than fifteen (15) pounds/S.Y. for six (6) inches of lime treated subgrade. Lime treated subgrade will be included as a "structural layer" within the pavement design calculations. Proposals for stabilization alternatives in place of the use of lime will be considered upon submittal of an engineering report verifying adequate stabilization of the highly plastic soil.

Where the roadbed is in a rock excavation a “Structural Layer” within the pavement design calculations can be used that is equivalent to a structural layer for Lime Stabilized Subgrade. If a roadbed Structural Layer is used in the pavement calculation for rock subgrade an Engineering Report will be provided to Public Works addressing the consistency of the subgrade prior to base placement.

(6) Pavement layer material

Alternative pavement materials may be used where the existing soil or subsurface conditions, or the alternative materials, provide a level of driveability comparable to the materials otherwise required by this Section. Proposals for alternative pavement materials with supporting engineering documentation may be submitted to the city for consideration for use. The combination of the following materials will be allowed for pavement structure:

A. Lime treatment for subgrade.
B. Flexible base.
C. Prime coat.
D. Tack coat.
E. Hot mix asphaltic concrete pavement.
F. Asphalt treated base.
G. Reinforced concrete.
H. Base reinforcement (Geogrids).

The Director of Public Works in accordance with the standards provided herein must approve the pavement combination.

(7) Minimum layer thickness (compacted)

If the following components are utilized in proposed pavement sections, the minimum thickness for the components shall be:

A. Hot mix asphaltic concrete pavement shall not be less than one and one-half (11/2) inches thick for surface course (Type D).

B. Hot mix asphaltic concrete pavement shall not be less than two and one-half (21/2) inches thick for a leveling-up course (Type B).
C. Asphalt treated base shall not be less than four (4) inches thick.
D. Flexible base shall not be less than six (6) inches thick.
E. Lime treatment for subgrade shall not be less than six (6) inches thick.

(8) Curb and gutter

Concrete curbs or monolithic curbs and gutters constructed in accordance with the details shown on Figure 506-9 shall be provided where indicated on the typical cross sections provided in Subsection (d) of this Section.

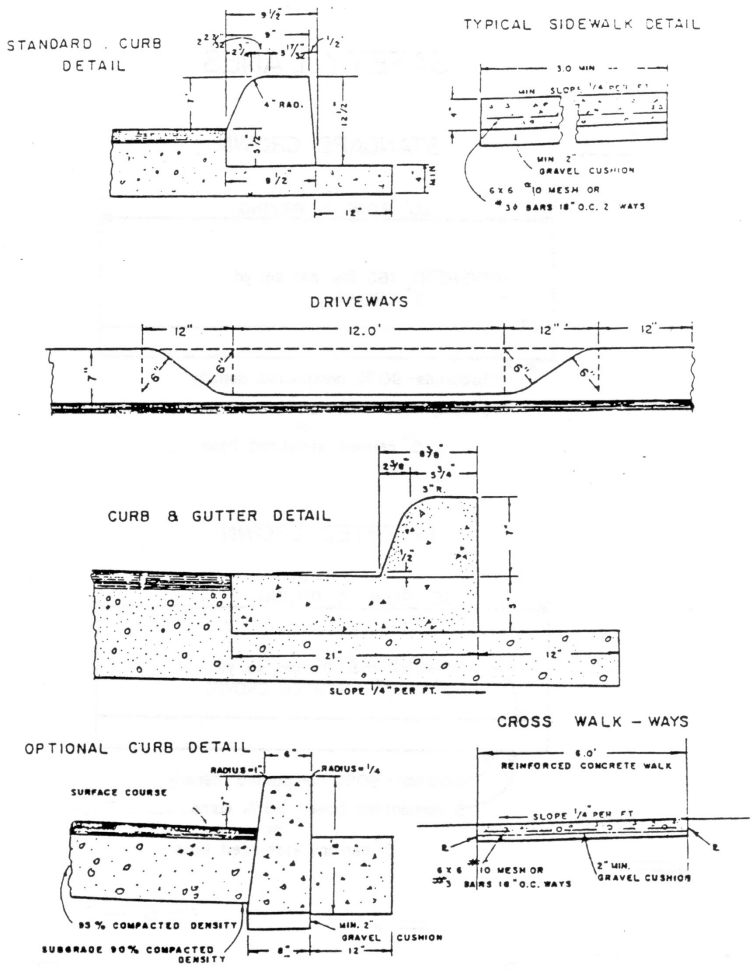

STANDARD CURB DETAIL
TYPICAL SIDEWALK DETAIL
DRIVEWAYS
CURB & GUTTER DETAIL
OPTIONAL CURB DETAIL
CROSS WALK – WAYS
REINFORCED CONCRETE WALK
SURFACE COURSE
95% COMPACTED DENSITY
SUBGRADE 90% COMPACTED DENSITY
GRAVEL CUSHION

Figure 506-8

(9) Medians and dividers

Medians and dividers having curbs shall be constructed in accordance with the approved cross section. Where divider strips on primary and secondary Streets are constructed without curbs, they shall be graded to a slope of one-quarter (0.25) inch per foot from the center of the divider strip to a point seven (7) inches from above the edge of pavement and from that point to the edge of pavement.

(10) Parkways.

Parkway slopes shall be one-quarter (0.25) inch per foot toward the Street except in heavy cuts, where a maximum of one (1) inch per foot shall be permitted. Landscaping, walls or fences placed in the parkway for aesthetic purposes shall not obstruct sight distance.

(q) Sidewalk Standards

(1) Applicability

Sidewalks shall be required on both sides of all internal Streets and the subdivision side of all adjacent or perimeter Streets except as specified in Subsection (2), below. Reverse residential Street lots shall have sidewalks provided on both Street frontages. Sidewalks shall be required as part of the street improvements only on one (1) side of subdivision entry streets unless residential lots are platted or planned to be platted on both sides of the street.

(2) Sidewalk exceptions.

Sidewalks shall not be required in the following situations:

A. When a pedestrian circulation plan accompanied by the plan review fee specified in Appendix C has been submitted to and approved by the planning commission prior to or at the time of plat approval. The pedestrian circulation plan shall show the location and arrangement of all-weather walkways and the phasing or time schedule for the construction of the walkways. In considering the plan, the planning commission shall require and may impose conditions to ensure that access to and along the walkway areas is safe, convenient, and provides pedestrians with adequate paths of movement. If the proposed walkways are not located within a public right-of-way, then pedestrian easements shall be included on the plat.

B. When the Director of Public Works determines that the sidewalks will interfere with or disrupt drainage.

C. When the Director of Public Works determines that public construction which would require sidewalk replacement will take place on the Street within three (3) years.

D. On local type A Streets in single- or two-family residential subdivisions with a density less than 2.5 residential units per acre.

E. On Streets in residential subdivisions where no adjacent lots are platted if approved by the Director of Public Works, such as Streets adjacent to walls or drainage ways.

F. Where the Director of Public Works determines that preservation of trees warrants the elimination, reduction in width, or modification to the sidewalk and curb requirements in accordance with the Tree Preservation Standards.

(3) Planting Strips

Sidewalks shall be defined by placing a planted strip of not less than two (2) feet minimum between the back of the curb (BOC) and the street edge of the sidewalk. Street trees may be located in the planting strip if trees are a minimum of three (3) feet from the curb.

(4) Performance Agreement and Time of Construction

Sidewalks shall be included as part of the Performance Agreement required by Appendix 35-438 of this Chapter with exception to sidewalks along street frontage of lots within the city limits for which building permits will be required. All sidewalks within a subdivision must be completed when ninety-five (95) percent of the lots within the subdivision are built out, excluding lots for which a building permit is pending.

(5) Width

Except as otherwise specified in Americans with Disabilities Act (ADA) (see § 35-501(e) herein), sidewalks shall have a minimum unobstructed width as follows:

A. The minimum width of sidewalks adjoining a planting strip shall be four (4) feet in width.The minimum width of sidewalks adjoining the curb shall be six (6) feet in width for Collectors and Arterials and four (4) feet for Residential.

B. The minimum width of sidewalks located within the boundaries of the “D” Downtown District shall be not less than six (6) feet.

(6) Location

All sidewalk construction shall conform to the latest criteria of the Americans with Disabilities Act (ADA) (see § 35-501(e) herein). Changes in the sidewalk location for a maximum linear distance of two hundred (200) feet are permitted to be approved by the field inspector without amending the Street plan or utility layout provided such plans are annotated with a note stating that intent. During the plat review process, reviewing agencies may designate areas where prior approval of the agency is necessary for any alteration to the sidewalk location. No other changes shall be allowed without the approval of all agencies which approved the original utility layout.

(7) Continuity

Sidewalks shall not be installed in such a manner that they conflict with or are obstructed by power lines, telephone poles, fire hydrants, traffic/Street signs, mail boxes, trees, buildings, barriers, light poles, or any other structure. The grades of sidewalks shall be such that changes of grades greater than ten percent (10%) are not encountered within blocks. When there is an existing or anticipated obstruction, the sidewalk shall be installed around the object and shall provide the required sidewalk width. When utility layouts are required as part of a plat, the location and extent of sidewalks within the subdivision shall be shown on the utility layout and shall be subject to the approval of the Director of Public Works and the utility agencies.

(8) Drain Crossings

Pedestrian double rails shall be required on both sides of all sidewalk drain crossings.

(9) Grade

Sidewalks shall be constructed so as to align vertically and horizontally with adjoining sidewalks.

(10) Sidewalks on private Streets.

Sidewalks on private Streets shall meet the same criteria as for public Streets. Sidewalks shall be included in the same lot as the private Streets or within an access easement designated on the plat if located on private lots. Deed restrictions shall be required to ensure that sidewalks remain unobstructed.

(r) Access and Driveways

(1) Applicability

The provisions of this section shall apply to all Driveways. A lot which is a part of an approved Plat which does not otherwise limit access and which was approved by the city and filed for record as of the effective date of this Section, and which does not have sufficient frontage to meet the driveway approach spacing requirements in this section, shall be allowed one driveway approach.

(2) Single-Family Residential Subdivisions

Where a subdivision abuts a major thoroughfare, lots for single-family residential use in the ETJ or in residential zoning districts shall not front on the thoroughfare, the sole exception shall be lots greater than one (1) acre in size which provide for permanent vehicular turn around on the lot to prevent backing onto the thoroughfare and this restriction should be noted on the plat. Access points which would permit vehicular access to such lots less than one acre in size from the thoroughfare shall be prohibited. However, if conditions are such that vehicular access to such lots cannot be provided other than from the collector or arterial street, the Director of Public Works may permit the creation of a marginal access street or easement to serve two (2) or more lots. The marginal access street or easement shall be designed to

permit entry to the thoroughfare without requiring a motorist to execute a backing maneuver. Marginal access streets or easements shall be included on the subdivision plat.

(3) Commercial, Industrial And Medium Or High Density Residential Developments

Lots in commercial, industrial and medium or high-density residential developments in the ETJ or in the MF, NC, O, C, I-1, or I-2 zoning districts may have vehicular access from a thoroughfare. However, the number of access points permitted will be based on the following criteria: (A) for lots with less than two hundred (200) feet of frontage, one (1) access point may be permitted; (B) for lots with a frontage of two hundred (200) feet or more, one access point for every 200 feet of frontage will be permitted. Driveway spacing will be in accordance with subsection (7) below, if applicable. All lots in NC, O, and C zoning districts with less than 400 feet fronting an arterial Street shall provide for shared cross access with adjacent lots fronting the arterial, by means of platted common access easement across the lot or recorded deed covenant providing common access across the lot with adjacent lot(s).

(4) Additional Access Points

The Director of Public Works (or Texas Department of Transportation, or county authority, if appropriate) is authorized to permit additional access points under the following conditions: (A) the additional land; and access points are necessary to ensure the property owner beneficial use of the land; and (B) the resulting additional ingress and egress of vehicles will not seriously disrupt the flow of traffic on the thoroughfare.

(5) Location of Access Points

The specific location of access points will be determined by the Director of Public Works (or by the Texas Department of Transportation or county authority, if appropriate) at such time as a site plan is reviewed prior to the issuance of a building permit. The location shall be based on the following criteria: (A) the location shall minimize conflicts with vehicle turning movements; (B) the location shall be located as far as practicable from intersections; and (C) the location shall be not less than fifty (50) feet from another driveway location. If this standard is not possible, based upon the frontage of the property, the location shall be directed as far as practicable from the other driveway locations. Driveways along an arterial within 400 feet of a major intersection, such as the intersection of two arterial streets or the intersection of a collector and an arterial street, may be restricted to right turn movements.

(6) Driveway Throat or Vehicle Storage Length

For purposes of this Subsection, “Throat Length” means the length of extending from the entry into the site to the first left-turn conflict or intersection with a parking aisle. Vehicle Storage Length means the length of a driveway, service lane, bay, or other passageway for motor vehicles which is designed to minimize queuing onto surrounding Streets. Throat Length shall be designed in accordance with the anticipated storage length for entering and exiting vehicles to prevent vehicles from backing into the flow of traffic on the public street or causing unsafe conflicts with on-site circulation. Throat Length and Vehicle Storage Length shall not be less than the standards set forth in Table 506-7 unless approved by the Director of Public Works

These measures generally are acceptable for the principle access to a property and are not intended for minor driveways.

Table 506-7 Minimum Driveway Throat Lengths

Land Use	Throat Length or Vehicle Storage Length
Shopping Centers > 200,000 GLA	Throat Length 200'
Developments < 200,000 GLA not otherwise enumerated in this Table	Throat Length 75'
Unsignalized driveways not otherwise enumerated in this Table	Throat Length 40' minimum
Residential subdivision entryway (Private, gated entries)	Poisson distributed probability model at a 95% confidence level. In addition, the subdivider shall provide for vehicle turnaround capability based on the single unit design vehicle as provided in the 1990 AASHTO Green Book, or latest revision thereof. The minimum entryway vehicle storage length shall be forty (40) feet.
Single-lane drive-in banks	Sufficient to accommodate minimum queue of six (6) vehicles
Drive-in banks with more than one (1) lane	Sufficient to accommodate minimum queue of four (4) vehicles per service lane
Single-lane drive-through car washes	Sufficient to accommodate minimum queue of twelve (12) vehicles
Automatic or self-serve car washes with more than one bay	Vehicle storage of 60 feet per bay
Fast-food restaurants with drive-in window service	Sufficient to accommodate minimum queue of eight (8) vehicles per service lane
Gasoline service stations with pump islands perpendicular to the pavement edge	Minimum 35 feet between pump islands and right-of-way

Commentary: The throat lengths in Table 506-7 are provided to assure adequate stacking space within driveways for general land use intensities. This helps prevent vehicles from stacking into the thoroughfare as they attempt to access the site. High traffic generators, such as large shopping plazas, need much greater throat length than smaller developments or those with unsignalized driveways. These standards refer to the primary access drive.

(7) Spacing and location on major thoroughfares

This subsection applies to driveway approach spacing and location along major thoroughfares..

A. Where a Traffic Impact Analysis is required, driveways shall be spaced in such a manner as to avoid reducing the traffic LOS below that established in the Section 35-502 Traffic Impact Analysis.

B. Along either side of any corner commercial or industrial property the driveway approaches shall be located so as to maintain a minimum distance from the corner of the intersecting roadways equal to 90 percent of the length of the property along the roadway upon which the proposed driveway approach is to be located, or 125 feet, whichever distance is less.

(8) Alignment

Major Driveway approaches, with Peak Hour Trips greater than 100 pht, accessing major thoroughfares shall attempt to meet the following guidelines:

A. Align with opposing driveway approaches if any, or shall be offset by 175 feet or more to provide adequate left turn storage capacity in advance of each driveway approach and to avoid the overlap of left turn lanes.

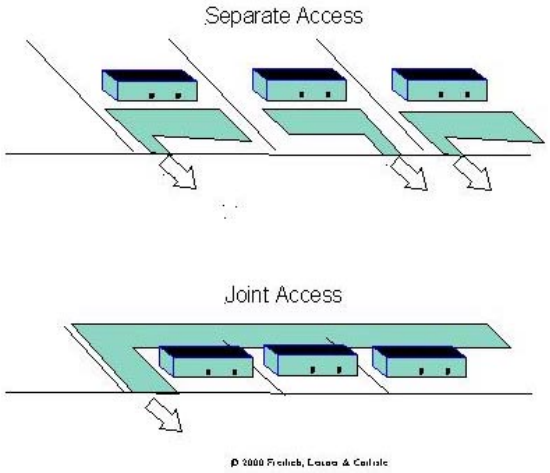


Figure 506-10

B. Shared among different property owners or users when necessary to maintain minimum spacing requirements.

C. Planned, when possible, to match existing openings in medians. In addition, no cuts through the left turn reservoir of a median shall be permitted in order to provide left turn movements for driveway approaches accessing major thoroughfares.

(9) Parking Approaches

Parking aisles shall be located a minimum of twenty (20) feet from the intersection of the driveway approach and the Thoroughfare.

(10) Driveway Approaches

Driveway approach materials may be asphalt, concrete or other materials as approved by the Director of Public Works.

(s) Gated Subdivision Streets

(1) Pavement Management

The Applicant shall include with the Homeowners Association (HOA) documents a forecast and schedule of Street maintenance costs prepared by a licensed professional engineer, licensed as such by the State of Texas. A Maintenance Account with seed money shall be established by the developer to enable the HOA to meet the maintenance schedule until the HOA is self sufficient. Any HOA requesting that the City acquire their private Streets shall produce documentation that the maintenance schedule set forth in the HOA's original Pavement Management Plan as part of the HOA documents has been followed.

(2) Fire Lanes

The HOA documents shall require the HOAs to identify and enforce a no parking restriction in fire lanes throughout the community.

(3) Master Key Security System

A master key security system shall be provided on all gates. The security system shall include the following:

A. a gate override in case of power failure; and
B. a master key provided to the Fire Department, the School District, and Police Department.

(4) Queuing

At gated entrances where traffic can queue into public streets, the gates and entrances design must provide for sufficient storage capacity such that a poisson distributed probability model (95% confidence level) shows that no queuing vehicles will queue into the public street. The entryway, including the paved surface area lying between the Street providing access to the subdivision and the gates, shall include a turning radius of not less than forty (40) feet.

(5) Connectivity

The street system shall comply with the connectivity standards (Subsection (e) of this Section).

(t) Traffic Calming

The purpose of this Section, along with § 35-515(b)(4) (Lot Layout Standards – Block Length and Perimeter) of this Article, is to protect the public health, safety and general welfare by ensuring that speeds on local Streets are suitable for their intended purpose. The City hereby finds and determines that long blocks, wide Street cross-sections and uninterrupted traffic flows can encourage speeding on local Streets. Accordingly, these design standards will slow traffic on local Streets while allowing flexibility in design and offering Applicants the choice of treatment that works best for the Streets in a Proposed Development.

(1) Applicability

The provisions of this subsection shall apply to Local Streets

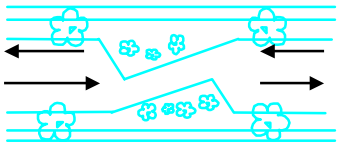
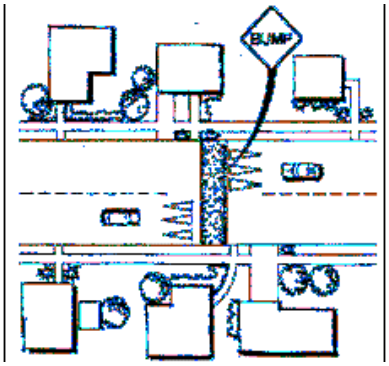
(2) Street Lengths

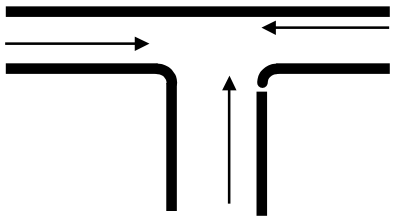
The length of Street Links shall comply with the block length standards established in § 35-515(b)(4) of this Chapter.

(3) Traffic Control Calming Features

A longer Street length may be allowed through the placement of an approved traffic calming feature at a location which produces an unimpeded length of the Street Link which does not exceed the block length standards (§ 35-515(b)(4)).

The following provisions describe and establish standards for permitted traffic calming devices where traffic calming measures are permitted as part of the roadway design elements in subsection B, above. The descriptions set forth herein are described in the document entitled R. Ewing, Traffic Calming: State of the Practice (Institute of Transportation Engineers (ITE) and the Federal Highway Administration (FHWA), 1999), which document is hereby incorporated by this reference. Traffic calming options for Locals and Collector Streets are noted below:

APPROVED TRAFFIC CONTROL DEVICES & DESCRIPTION	
Neckdowns/ Flares / Street Narrowing / Intersection Throating. Neckdowns are curb extensions at intersections that reduce roadway width curb to curb. They are sometimes called slow points, nubs, bulbouts, knuckles, or intersection narrowing. These traffic control measures reduce the width of a section of roadway in a gradual manner. They shorten crossing distances for pedestrians and drawing attention to pedestrians via raised peninsulas. By tightening curb radii at the corner, the pedestrian crossing distance is reduced and the speeds of turning vehicles are reduced. The effect of this measure is to reduce speed and discourage non-local traffic. Motorists react to this measure with slower speed because of a concern of a limited travel path.	
Roundabouts / Traffic Circles. are raised circular structures constructed at a three-way or four-way intersection. Its objectives are to slow speeding and reduce the number and severity of vehicular accidents. This measure is most suitable for wide intersections and may accommodate all size vehicles by applying appropriate engineering designs.	
Speed Humps are raised pavement features constructed across the width of the street. The speed hump shall be 3 inches high and 12 feet in length from the leading edge to the trailing edge. This feature discourages motorists from speeding and encourages them to obey the posted speed limit. When speed humps are constructed, advisory signs shall be installed to notify motorists of the speed hump and an appropriate advisory travel speed.	 **© 1999 Institute of Transportation Engineers. Used by permission.**
Median Islands are raised circular landscaped areas located within non-intersection, midblock locations. Median islands channelize traffic and separate opposing flows.Traffic must slow down to maneuver around a median island. Median islands offer landscaping opportunities and maintenance responsibility. Median islands can be used to protect existing trees.	

"T" intersections are at-grade intersections where one of the intersecting Street Links is perpendicular to the other two. Traffic must slow down to negotiate the turning maneuvers in a T-intersection. This roadway feature is very common. Motorists are familiar with T-intersections.	

(4) Maintenance

Maintenance of landscaping associated with traffic calming features shall be the sole responsibility of the homeowner's association.

35-507 Utilities

This Section implements the following provisions of the Master Plan:

- *Urban Design, Policy 1g: Prepare design and construction policies and standards for utility and transportation infrastructure, capital improvement projects, public facilities and development projects that reinforce neighborhood centers and provide diverse, pedestrian-friendly neighborhoods.*

- *Urban Design, Policy 4c: Encourage utility and telephone line locations to be in the rear of property, underground or otherwise give aesthetic and economic consideration to alternative locations.*

(a) Applicability

The provisions of this chapter shall apply to all persons, and political subdivisions of the state, designing or installing or causing to be designed or installed the following within the corporate limits of the city or within the city's extraterritorial jurisdiction, as that term is defined by the Municipal Annexation Act, compiled as V.T.C.A., Local Government Code § 42.001 et seq.:

(1) sanitary sewers
(2) storm sewers
(3) water transmission or distribution lines
(4) electric power lines
(5) telephone lines
(6) natural gas lines
(7) cable television lines

(b) Generally

Easements shall be provided for the utilities set forth in subsection (a), above, as provided herein. Easements widths shall be in accordance with the utility service provider requirements.

(c) Location

All utility lines, including water lines, sewer lines, cable, and electric lines or poles shall be located in accordance with the Right-of-Way Management Ordinance and the Utility Excavation Criteria Manual.

(d) Water, Wastewater and Recycle Water Systems.

(1) Generally

All subdivisions within the city and its extraterritorial jurisdiction shall be provided with water and wastewater and recycle water shall be installed in accordance with the San Antonio Water System's "Utility Service Regulations."

(2) Exemptions

A water supply and distribution system is not required for subdivisions which meet all of the following conditions:

A. The subdivision is located outside the city limits within its extraterritorial jurisdiction.

B. The subdivision is located outside the area included within the current San Antonio Water System's master plan for water works improvements; and

C. Each lot has a minimum size of two (2) acres; and

D. A potable ground water supply which meets the Texas Department of Health's drinking water standards underlies each lot and such water is available in sufficient quantity to furnish the domestic water needs of the improvements to be constructed on the individual lots within the subdivision.

E. The plat of the subdivision is annotated with the following note:

I hereby certify to the best of my knowledge that at the time of planning commission approval, a potable ground water supply which meets the current standards as established by the Texas Department of Health for drinking water underlies each lot and such water is of sufficient quantity to supply the domestic needs of the improvements to be constructed on the individual lots within the subdivision. Each individual property owner is responsible for the construction of an individual water well that is in compliance with the rules and regulations of the Texas Department of Health.

_____
Registered Professional Engineer

Sworn and subscribed before me this the _____ day of _____ A.D. _____ [insert year].

Notary Public
Bexar County, Texas

(3) Exemptions Wastewater Collection and Disposal

Connection to a sanitary sewer system is not required for a subdivision that meets both of the following conditions:

A. Connection to a sanitary sewer system will required unreasonable expenditure when compared with other methods of sewage disposal, Such cost estimates of the sanitary sewage system versus the proposed methods of sewage disposal must be submitted to the San Antonio Water Systems (SAWS) for approval.

B. Bexar County, or other local authority as warranted, approval to use a non-site sewage disposal system for the subdivision.

(e) Penalties.

(1) Nonconforming work.

Any plumber whose work does not conform to the regulations and requirements of this chapter, or whose workmanship or materials are of inferior quality, shall, on notice from the director of planning, make the necessary changes or corrections at once. If the work has not been corrected after ten (10) days notice, the director shall refuse to issue any additional permits to such person until the work has fully complied with these requirements.

(2) False Statements or Misrepresentations

The director of planning may revoke a permit in the event there has been any false statement or misrepresentation as to a material fact in the application or plans upon which the permit approval was based. No permit fees shall be refunded in such event.

(f) Easements.

(1) Generally

Easements may be permitted for a specific purpose when requested by a particular utility. Such specific use easements shall be a part of a lot or lots unless designated to be converted into public Street right-of-way. Easements may be designated to be converted into public Street right-of-way on a subsequent plat without vacating and replatting. Such easement shall be annotated with the following note:

"Easement to expire upon incorporation into platted public Street right-of-way."

(2) Use of Easements

If the owner of the property upon which a utility easement is located desires to use it for lawn purposes, fencing across the easement shall be permitted but gates along the side lot lines must be provided. The gates shall be sixteen (16) feet wide (two (2) eight-foot gates) and shall be capable of being opened and closed at all times. These gates shall be secured in the center by a drop rod or some similar device which does not obstruct free passage over the easement. The drop rod may be lowered into a drop rod keeper installed so as to be flush with the ground level. No permanent-type center pole for the gates may be erected. The gates shall remain unlocked at all times. Property owners who do not desire to use a utility easement for lawn purposes may fence their backyard area at the easement line. The property owner is

responsible for the maintenance of the unused easement area even though it may be located beyond the rear fence of the property.

(3) Maintenance

Maintenance of the utility easement is the responsibility of the owner of the property upon which it is located. It shall be the duty of the property owner to keep the area clear of any structure, debris, vegetation, trees, shrubs or landscaping whatsoever, except that lawn grass which shall be regularly mowed and controlled may be grown thereon.

(4) Curb Exposure

Normal curb exposure shall be maintained where utility easements intersect Streets.

(5) Overhead Utility Lines

Overhead utility line easements shall be provided to afford clearance from overhead utility lines as specified by the National Electrical Safety Code, city public service regulations, and other applicable codes and laws. City public service will provide the information necessary to comply with these requirements.

(6) Connection of Easements

Where utility easements are not themselves straight within each block or if they do not connect on a straight course with the utility easements of adjoining blocks, then an additional easement shall be provided for the placing of guy wires on lot division lines in order to support poles set on curving or deviating rights-of-way or alleys.

(7) Structures within Easements

Permits shall not be issued for construction of fences or other structures not in compliance herewith.

(g) Overhang easements.

In all alleys overhang easements for electric and telephone lines of at least four (4) feet on each side of the alley strip at a height at or above eighteen (18) feet shall be provided.

35-508 Impact Fees

(a) Authority.

This article is adopted pursuant to V.T.C.A., Local Government Code Chapter 395 and shall not limit the city's authority to impose additional impact fees or charges if such impact fees or charges are specifically authorized by state law and duly adopted by ordinance.

(b) Effect on other parts of this code.

This article shall not limit the permissible use of property, density of development, design and improvement standards and requirements, or any other aspect of the development of land or provision of capital improvements subject to the zoning, subdivision, and other regulations set forth in this code.

(c) Additional requirement

Impact fees are additional and supplemental to, and not in substitution of, any other requirements imposed by the city on the development of land or the issuance of building permits.

(d) Water and Wastewater service.

Impact fees for water service are governed by the San Antonio Water System's Regulation which are adopted as a part of this article.